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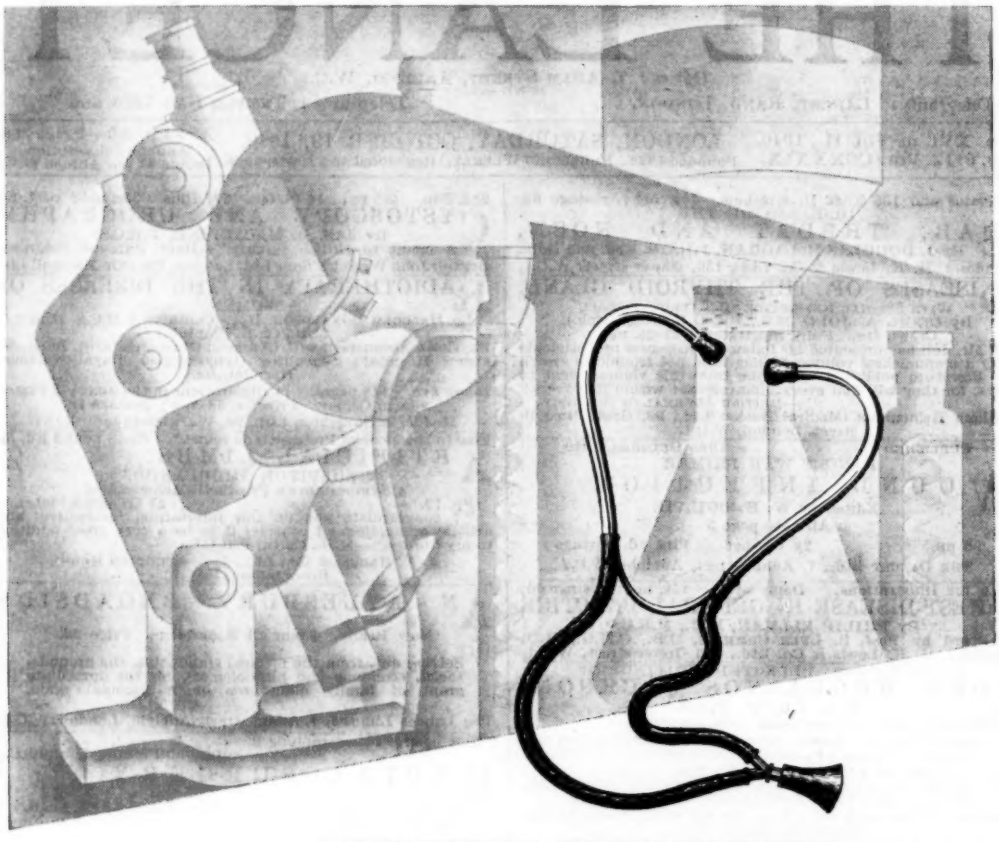

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ORIGINAL ARTICLES

ADHERENT PERICARDIUM
CONSTRICTIVE AND NON-CONSTRICTIVE

BY T. G. ARMSTRONG, M.B. Camb., M.R.C.P.
(*From the Department of Medicine, Cambridge University*)

THE history of adherent pericardium reveals a strange diversity of opinion as to its effects on the heart. Lower (1669), Vieussens (1715) and Boerhaave suggested that adherent pericardium was sometimes the cause of heart failure. Morgagni (1760) stated that it led to absence or weakness of the apex beat, with œdema and ascites. Lieutaud (1767) described 23 cases and gave the chief symptoms as dyspnœa, a small pulse, œdema, and ascites. Corvisart (1818) described 3 cases that died within twelve months of the onset from œdema and ascites. Thus the earliest reliable records laid stress on the "small quiet heart," and on the preponderance of ascites in the clinical picture.

It was not until 1832 that the first claim that adherent pericardium produced enlargement of the heart was put forward by Hope, but the writings of the Broadbents (1895) emphasised this view to such an extent that the profession came to accept cardiac enlargement as the most important, if not the only, effect of the lesion. None the less, in 1842, Norman Chevers had contested this view and on wide experience had written that he had never seen enlargement of the heart associated with adherent pericardium unless there were coincident valvular lesions. He believed that hypertrophy only followed valvular lesions and that pericardial fibrosis, on the contrary, showed a "tendency to be followed by general diminution in the size of the heart and its vessels and contraction of its cavities." In 1845 King gave his view that any hypertrophy due purely to adherence of the pericardium must be inappreciable in degree and devoid of all signs and symptoms.

In chronological order, the following beliefs about the effects of adherent pericardium have thus been expressed.

1. That it may cause a cardiac failure characterised by a small heart associated with œdema and ascites.
2. That it may have no effect at all.
3. That it may cause failure with enlargement of the heart.

In the light of modern knowledge the first two of these beliefs are undoubtedly correct, the third is unproved, and there is considerable evidence to show that it is untrue.

The work of Volhard (1923) and many others (White 1935, Beck 1929 and 1937, Beck and Griswold 1930, Beck and Cushing 1934), has shown that "adherent pericardium," or more properly "pericardial fibrosis," may cause constriction and cardiac compression of which a small heart and ascites are the dominant clinical findings. Thus the first historical view is upheld.

All morbid anatomists are aware that an adherence of the layers of the pericardium may be found at autopsy in patients who have died from intercurrent disease without either cardiac enlargement or cardiac failure. Hosler and Williams (1936a and b) approached the topic from an experimental standpoint and sutured the heart to the diaphragm in dogs that were subsequently given strenuous exercise for 2½ years. In one animal a saccular aneurysm of the right ventricle was caused by the pull on the heart, but no increase in the size or weight of the heart was ever found. They also quoted post-mortem records to show that enlargement of the heart never developed in the absence of valvular lesions or other cardiovascular disorder. These findings are in keeping with a personal series of 114 unselected cases of complete adherence of the pericardium collected from the records of the London Hospital. Extrapericardial adhesions occurred with the usual frequency. In 31 cases there were no symptoms. Enlargement of the heart was present in 72 cases but was invariably associated with rheumatic pancarditis, valvular lesions or other cardiovascular disease which might itself be the cause of cardiac enlargement. These observations show that the second historical view is certainly correct; they throw great doubt on the validity of the third belief.

HISTOLOGY OF ADHERENT PERICARDIUM

It is a striking fact that one pathological process, "adherent pericardium," should be capable of causing two such different effects. It seems that at least two different pathological entities must be at work, masquerading under a single name. What then is the factor that decides whether or not the heart is compressed?

An investigation was made into the histology of the pericardium in cases taken from the series of 114 London Hospital autopsies at which complete adherence of the pericardium had been found; 4 cases of cardiac compression from which the pericardium had been removed at operation were added. The cases were divided into two groups.

1. Adherent pericardium associated with chronic compression of the heart—the "constrictive" group.
2. Adherent pericardium without cardiac compression, the "non-constrictive" group.

Except in the operative cases, the evaluation of these groups was made on the basis both of clinical and of complete pathological evidence. In each case the diagnosis of constrictive pericarditis rested on a sure foundation. The constrictive group consisted of 10 cases, 6 post-mortem, 4 operative; the non-constrictive group consisted of 28 cases, 20 of which were rheumatic and 8 non-rheumatic. The macroscopical and histological appearance of the pericardium in these two groups showed clear and sharply defined differences.

CONSTRICTIVE GROUP

In the constrictive group the pericardium was thicker, denser and tougher than in the non-constrictive group and often large cavities were found containing inspissated caseous debris. In every case in the constrictive group the fibrous tissue had partly or completely undergone a process of hyalinisation. In all the 6 autopsy cases and in 2 of the operative cases this process was complete in the sections available for microscopy and the whole section was composed of hyaline fibrous tissue. In the other 2 operative cases the hyaline tissue was only patchy in distribution, but where it was not present the individual collagen fibres were seen to be much thicker and the fibrous tissue much more compact than its counterpart in the non-constrictive series. The general appearance of the tissue was more like fibro-cartilage than normal granulation tissue. The individual collagen fibres were closely bound together and of enormous thickness. They were swollen and structureless and presented a glassy translucent appearance without internal architecture. Their size contrasted strongly with the slenderness of the fibres in the non-constrictive group. The fibres ran, for the most part, parallel to one another, but in some sections a closely interlacing system of dense whorls was seen. The tissue was usually lacking in vessels, particularly capillaries, but in a few cases relatively large vessels were seen in small numbers. Typically the tissue was avascular and in this respect again contrasted strongly with the non-constrictive group. A single case showed some infiltration with polymorphonuclear leucocytes which suggested that a subacute septic inflammation was at work. In all the other cases there was no cellular infiltration, and apart from a few linear nuclei on the outside of the hyaline fibres the tissue was almost entirely acellular. Relatively large cavities were found containing old caseous debris often hæmorrhagic in type, and showing many spaces that had been the resting place of cholesterin crystals.

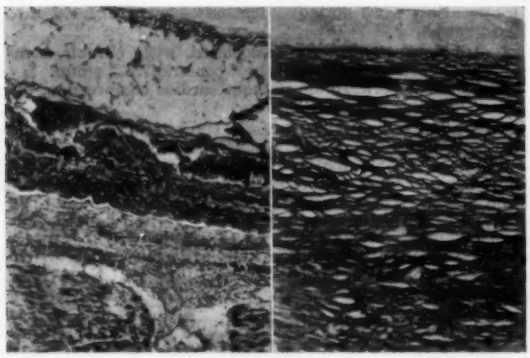
Of the 10 cases 8 showed calcification; this was present either in the form of multiple small nodules in the almost cartilaginous matrix or as plates over its surface or in the walls of the cavities. True bone formation had occurred in one instance. All sections were stained by the Gram and Ziehl-Neelsen methods, but no tubercle bacilli or other bacteria were found in the sections. Complete healing had taken place and had been succeeded by hyaline degeneration; no trace of the original inflammation (except in 1 case) was

apparent. The appearances presented by all these cases was that of the end-results of a widespread and devastating inflammation with great destruction of tissue, often right down to the surface of the myocardium itself.

NON-CONSTRICTIVE GROUP

By contrast, in the non-constrictive group the histological picture in the pericardium was a typical one of inflammation and healing. Out of the 28 cases, 2, both non-rheumatic, showed calcification and hyaline fibrosis, but in one it was only localised and could not have been expected to interfere with the heart, while in the other it was too thin (less than 1 mm.) to exert any effect. All the remaining cases were true to the following description.

The area of fibrosis was much thinner and less dense than in the constrictive group. The fibrotic pericardium was highly vascular and even the oldest tissue contained



A B

Histology of the pericardium in the constrictive and non-constrictive groups. Low power. Identical magnification. A. Non-constrictive group. Chronic rheumatic pericardial fibrosis. Note the slenderness of the fibres. B. Constrictive pericardial fibrosis of unknown ætiology. The upper part of the section shows a cavity containing caseous debris. Note the much greater thickness of the scar-tissue than in A.

many capillaries. There was considerable cellular infiltration consisting of lymphocytes, fibroblasts and epithelioid cells. The collagen fibres, especially in areas of old longstanding fibrosis, were fine and delicate and often thrown into waves. There was a crinkly appearance which gave the impression that considerable slack could be taken up in stretching and that if the tissue were subjected to tension it would break or pull out like a thread of wool. The individual collagen fibrils were very slender and never achieved the enormous size of the hyaline type found in the constrictive group. The difference between the two types is well seen in the photomicrographs A and B, which are representative of the two groups. The magnification in each illustration is the same, so that a comparison can be made both of the thickness of the fibrotic pericardium and of the individual fibrils.

DISCUSSION

It seems reasonable to conclude that in constrictive pericarditis the compression of the heart depends on the type of fibrous tissue present and on its thickness and density. Without fibrosis of this type there will be no compression of the heart, but it must not be assumed that when this dense tissue is present cardiac compression will result. To ensure compression it must be present in a suitable situation, for calcification of the pericardium has sometimes been noted either during life or at the autopsy table in patients in whom there had been no impairment of the heart's function (Vilvandré 1930).

Beck and Cushing (1934) in their description of surgical and autopsy cases of constrictive pericarditis describe h yalinisation as present in 3 of their 6 cases; in the remaining 3 it is not mentioned and so cannot be excluded. Beck and Griswold (1930) in their experimental cases following pericardial irrigation with Dakin's fluid found hyalinisation of the pericardial scar in dogs which gave the fully developed picture of chronic pericardial compression.

The histological picture in the two groups shows clearly that the density and toughness of the fibrous tissue is the deciding factor in producing cardiac compression. It explains in addition the great success of the operation of pericardectomy. The removal of an adherent pericardium will necessarily lead to further adhesions in healing, and if these were the cause of the original disability it would not be expected that operation would remove them. The reason for the success of this operation is that the peculiar fibrous tissue which compresses the heart does not repeat itself in the process of healing. When adhesions form, as indeed they will, they are of the normal kind and have no effect on the heart.

The different histological appearances in the two groups suggest also a difference in ætiology and explain the widely held clinical view that cardiac compression never follows a rheumatic pericarditis. The end-results of rheumatic inflammation are never such as have been described in the constrictive group, and the fibrous tissue formed is not such as would be expected to cause cardiac compression. It is a much less flagrant inflammation and is unaccompanied by great destruction of tissue or by caseation or hyalinisation. On pathological grounds as well as clinical, therefore, rheumatism can be excluded from the ætiology of constrictive pericarditis.

Positive evidence of the ætiology is more difficult to find. The inflammation described is identical with the end-results of tuberculosis and cannot be differentiated from it with the microscope. One case only in the present series was proved to be due to tubercle. In this case no bacilli could be demonstrated but typical tubercles were seen and a caseous gland was found to be adherent to the fibrotic pericardium. A second case, not included in the series because no autopsy was obtained, was also tuberculous in origin. This was a man who died from cardiac compression five years after a pericardial effusion from which tubercle bacilli were isolated during the acute phase. Tuberculosis can be accepted with certainty as one of the causes of constrictive pericarditis and indeed many such cases are already on record. Probably many more cases are of tuberculous origin than can be proved by histological or bacteriological methods.

The evidence is scanty, but it is probable that some cases are the end-result of a septic pericarditis.

Nigst (1934) records the case of a man who developed chronic cardiac compression during convalescence from a severe cellulitis of the leg and osteomyelitis of the femur. His abdomen was tapped 250 times in fifteen years! At autopsy the full picture of constrictive pericarditis was seen, including dense pericardial fibrosis with calcification. An acute pericarditis must have occurred soon after the infection of the leg but as it passed unnoticed clinically the bacteriological diagnosis was never established. It is likely, however, in view of the osteomyelitis, to have been due either to a staphylococcus or to a streptococcus.

Some evidence can be advanced from veterinary pathology in favour of septic pericarditis as a cause. Joest (1926) states that foreign bodies are commonly ingested by cows and after ulcerating through the reticulum and diaphragm come to rest in the pericardial sac where a septic inflammation may be set up. He describes in the following words the late results of this process, and also of septic pericarditis arising in other ways:

"The adhesions contain hyalinised tissue with unabsorbed fibrin in which later calcium may be laid down in the form of nodules or plates. If the condition is sufficiently widespread these may result in an armouring or girdle of chalk completely surrounding the heart. Very rarely actual bone formation may occur." And again, "The absorption of purulent exudate progresses very slowly and is often incomplete, so that it may lead to adhesions either of coagulated material or of granulation tissue, giving rise to caseous masses which may later calcify and be mistaken for tuberculosis."

The similarity between the end-results of this septic pericarditis in cows and constrictive pericarditis in man hardly needs emphasis.

SUMMARY AND CONCLUSIONS

Adherent pericardium may lead to cardiac failure associated with a small heart (constrictive type) or may

have no effect on the heart at all (non-constrictive type). There is no evidence that it causes enlargement of the heart unless it is accompanied by valvular or other cardiovascular disease.

The pathology of the two types shows well-defined differences, the deciding factor in producing constriction being the density and toughness of the fibrous tissue.

The constrictive type is never rheumatic; it has been known to be tuberculous, and has probably resulted in some cases from an unrecognised septic pericarditis.

This work was carried out during the tenure of a post-graduate fellowship of the Medical Research Council. I wish to thank Prof. H. M. Turnbull for the facilities of the Bernhard Baron Department of Pathology, without which this work could not have been carried out.

BIBLIOGRAPHY

Beck, C. S. (1929) *Arch. Surg., Chicago*, **18**, 1659.
— (1937) *Amer. Heart J.* **24**, 515.
— and Griswold, R. H. (1930) *Arch. Surg., Chicago*, **21**, 1064.
— and Cushing, E. H. (1934) *J. Amer. med. Ass.* **102**, 1543.
Broadbent, W. (1895) *Lancet*, **2**, 200.
Broadbent, J. F. (1895) Adherent Pericardium, London.
Chevers, N. (1842) *Guy's Hosp. Rep.* **5**, 387.
Corvisart, J. N. (1818) Essai sur les maladies et les lésions du cœur et des gros vaisseaux. 3rd ed. Paris, p. 37.
Hope, J. (1832) Diseases of the Heart, London, p. 192.
Hosler, R. M. and Williams, J. E. (1936a) *J. thorac. Surg.* **5**, 629.
— — (1936b) *Proc. Soc. exp. Biol., N.Y.* **34**, 528.
Joest, E. (1926) Spezielle Pathologische Anatomie Der Haustiere, Berlin, p. 376.
King, T. W. (1845) *Lancet*, **2**, 590.
Lieutaud, J. (1767) Historia anatomico-medica, Paris. Book 2, p. 72.
Lower, R. (1669) Tractatus de Corde, Amsterdam.
Morgagni, G. B. (1760) De Sedibus et Causis Morborum, Venice, Book 2, letters xxii and cexliv.
Nigst, P. F. (1934) *Schweiz. med. Wschr.* **64**, 966.
Vieussens, R. (1715) Traité nouveau de la structure et des causes du mouvement naturel du cœur, Toulouse, chap. 1.
Vilvandré, G. E. (1930) *Lancet*, **1**, 564.
Volhard, F. and Schmieden, V. (1923) *Klin. Wschr.* **2**, 5.
White, P. D. (1935) *Lancet*, **2**, 539, and 597.

TRUE CHYLOUS PLEURISY

REPORT OF A CASE

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THE cisterna chyli and thoracic duct are not uncommonly invaded by new growth, the primary tumour in a third of the recorded cases being in the stomach. In the case described below, however, the growth was a retroperitoneal sarcoma invading the psoas muscle (fig. 1). Where the thoracic duct enters the subclavian vein there was an organised and partially canaliculised clot, about 1 in. long, in which tumour cells were found (figs. 2 and 3). There was no evidence that the cisterna chyli was involved, or that there was continuous permeation from tributary lymphatics. Widespread embolic dissemination was not seen by the naked eye, the lungs being apparently clear, but the changes induced in the circulation of lymph probably determined the location of secondary growth in the supraclavicular glands. This case illustrates well the fact, originally pointed out by Bland-Sutton, that obstruction or even surgical ligation of the thoracic duct does not interfere with nutrition, in this way differing from a permanent fistula of the duct; for in the former instance the chyle is able to enter veins by collateral routes. This case was one of true chylous pleurisy, as the chemistry shows, and not due to the degeneration products of tumour growth.

FIG. 1—Growth invading psoas muscle—large round-celled sarcoma. (× 60.)

FIG. 2.—Subclavian vein with tumour growth marked T. (× 18.)

CASE-RECORD

The patient was a woman, aged 59, in the Royal Infirmary, Sunderland, with ten weeks' history of a small and slightly painful swelling in the left posterior triangle of the neck. This was followed three weeks later by a small painless lump over the anterior ends of the left fourth and fifth ribs. Soon afterwards dyspnœa and intermittent dry cough began. The dyspnœa and weakness gradually increased, ending in death ten weeks after the onset of the first swelling in the neck. The only previous illnesses were intermittent attacks of cholecystitis.

On admission there was no obvious wasting and only slight anæmia. Orthopnœa and slight cyanosis; pulse-rate 80–120, regular. Superficial discrete small hard glands attached to the skin in the left posterior triangle of the neck, left supraclavicular region, and upper part of the sternum. A relatively painless mass of hard matted glands, the size of a small orange, deep in the left posterior triangle. Slight tenderness and muscular rigidity in the right epigastric region.

The chest showed signs of extensive bilateral effusion only. Two days after admission 43 oz. of milky fluid were withdrawn

FIG. 3—High-power view of area marked in fig. 2, showing tumour cells in clot with duct canalisation.

from the right pleural cavity, and 27 oz. from the left. Paracentesis was discontinued owing to distress and deterioration of the patient's condition, ending in death four days later. The illness was afebrile until the last three days when there was slight intermittent pyrexia. The urine contained urates only.

Pleural effusion.—A milky fluid with some pink sediment and a few clots; opacity not reduced on centrifuging. Reaction alkaline; specific gravity 1·022. Centrifuged deposit contained numerous small lymphocytes, some red blood-cells, and large mononuclear cells. No globules of fat visible with the ⅙ objective. No organisms found; cultures sterile.

Chemical analysis: dextrose 0·07%; total fats 1·92% by weight (of these only a trace were neutral, the remainder being fatty acids); cholesterol a trace only; lecithin a trace only (the patient was on a low-fat diet); total protein 18·2%; nitrogen 0·025%; urea 46 mg. per 100 c.cm.; serum albumin 13·5%, serum globulin 0·83%.

Necropsy.—The body was not emaciated. Abdomen contained a small quantity of straw-coloured free fluid in the peritoneal cavity. The gall-bladder was fibrotic, contained many small faceted stones, and was surrounded by a large mass of new growth connected with a similar irregular hard mass in the lesser omentum. A large matted mass of tumour was situated over most of the posterior abdominal wall, surrounding the blood-vessels and invading the pancreas, psoas and iliacus muscles, and mesentery. Nothing else abnormal was found in the abdomen.

Each pleural cavity contained about two pints of milky fluid. The lungs appeared normal, apart from terminal congestion. The mediastinum appeared to be free from growth. The thoracic duct was a little thickened but not dilated; no leak was demonstrated in either the duct or its tributaries. The heart was fatty. A large mass of hard matted glands filled the left posterior triangle, both superficial and deep, and some small hard superficial glands were found in the subclavicular region, especially on the left, extending to the fifth ribs. The tissues were much indurated where the thoracic duct entered the subclavian vein, the duct dividing terminally into three branches, all entering close together. At their site of entry the subclavian vein contained an organised clot about 1 in. long, firmly adherent to the wall of the vein and partially occluding its lumen. A probe could, with difficulty, be passed along the tributaries of the thoracic duct into the clot but not quite into the vein.

The patient was under the care of Dr. M. Hickey outside the hospital and Dr. Hamilton Ross and Dr. Bruce Low in the hospital, to whom we are indebted for these notes.

BLAST FROM HIGH EXPLOSIVE

PRELIMINARY REPORT ON TEN FATAL CASES

BY

GEOFFREY HADFIELD JOAN M. ROSS

R. H. A. SWAIN JEAN M. DRURY-WHITE

PATHOLOGISTS IN THE E.M.S.

With a note on the

IDENTIFICATION AND ESTIMATION OF CARBOXYHÆMOGLOBIN IN FORMOL-FIXED MATERIAL

BY ARTHUR JORDAN

CHEMICAL PATHOLOGIST IN THE E.M.S.

DURING the last few weeks we have carried out post-mortem examinations on ten civilians who had died suddenly or in a few hours after short-range exposure to the detonation of high-explosive during aerial bombardment. In all cases circumstantial evidence pointed to death being due to "blast." In all but one case gross traumatic lesions were either completely absent or of trivial degree.

It is established beyond reasonable doubt that sudden death without gross trauma may result from the impact against the body of the violent, rapidly moving wave of high atmospheric pressure set up in the immediate neighbourhood of an explosion. Five of our cases we believe to have died from the effects of "blast," intrapulmonary capillary hæmorrhages being the only gross anatomical lesion common to them all. In three cases, considered from circumstantial evidence to be cases of blast, further investigation showed that in addition to the lung lesion, each had such a degree of saturation of the blood by carbon monoxide as to leave no doubt that carbon-monoxide poisoning was the cause of death. Two cases were extricated from overlying debris They were uninjured and at first were considered to have died of blast, but further examination showed that they had died from compression asphyxia.

The mechanism by which blast produces its grave effects is a problem calling for immediate solution and we are at present engaged in its study. Our objects in publishing this preliminary report are to place on record the main features of the pulmonary lesion found in this series, and more especially to call attention to the possibility that cases resembling those due to blast may show a dangerous or grave degree of saturation of the blood by explosion gases such as carbon monoxide or nitric oxide, whilst others showing no gross trauma may have died from compression asphyxia.

Most of the post-mortem examinations were carried out under difficult conditions and immediate spectroscopic examinations of the blood were not always possible. In these cases the blood expressed from the lung after fixation in formol saline was examined by Dr. A. Jordan with the Beck Hartridge reversion spectroscope. Control experiments were carried out to determine whether formalin fixation interfered in any way with the identification of carboxyhæmoglobin or with the estimation of its relative concentration. The details of these experiments are reported separately at the end of this paper. They showed that the identification of carboxyhæmoglobin in blood expressed from lungs which had been fixing in formalin for two to three days presented no difficulty, but that, since there was a relatively slow conversion of carboxyhæmoglobin into methæmoglobin, the estimation of the percentage saturation of carboxyhæmoglobin gave figures which were lower than the actual saturation present during life.

CASE-REPORTS

Case 1.—Man, aged 45. Found dead in public shelter which sustained a direct hit by a bomb. Hypostasis pink. Blood in nares and mouth. No external injuries. Blood-stained frothy mucus in the upper air-passages.

Lungs: abnormally pink, generally congested and anthracotic; irregular hæmorrhagic areas scattered through both lungs; no areas of collapse. *Heart:* right side contained friable clot; fluid blood in pulmonary artery; valves normal; post-mortem staining of intima of great vessels. *Brain:* no gross abnormality. *Other organs:* normal.

Carboxyhæmoglobin not present on spectroscopic examination of formol-fixed material.

Microscopically.—Post-mortem autolysis. Lungs show considerable degree of chronic bronchitis and emphysema with heavy deposits of carbon. In the hæmorrhagic areas there is over-distension and rupture of some alveoli and free capillary bleeding over wide areas.

Case 2.—Man, aged 81. Survived ten hours after rescue from bombed shelter. Rigor mortis but no hypostasis. No evidence of external injury. Frothy blood-stained mucus in upper air-passages.

Lungs: congested but no subpleural hæmorrhages; considerable degree of chronic bronchitis and emphysema. Areas of hæmorrhage of varying size and irregular shape into substance of both lungs. Massive collapse not detected. *Heart:* gross atheroma of mitral and aortic cusps and coronary artery; hypertrophy of wall of left ventricle and scarring from old infarction; friable clot in right ventricle and fluid blood in pulmonary artery. *Kidneys:* scarring due to vascular disease; generalised athero-sclerosis. *Stomach:* a few petechial hæmorrhages on lesser curvature. *Brain and other organs:* normal.

No carboxyhæmoglobin found on spectroscopic examination of formol-fixed material.

Microscopically.—Lungs show scattered areas of collapse, and free escape of red blood-corpuscles into the alveoli in the region of the hæmorrhages with mild, early polynuclear infiltration. Hæmorrhage into walls of some bronchioles.

Case 3.—Man, aged 40. Found dead in public shelter which sustained direct hit by a bomb. Well nourished; hypostasis pink. Contused wound on skin and fingers of right hand; no other injury. Blood running from anterior nares.

Frothy blood in *trachea* and *bronchi*. *Lungs:* extremely congested, especially lower lobes; this general congestion made it impossible to identify any well-defined areas of recent hæmorrhage. *Heart:* normal size; valve cusps healthy; aorta stained bright red. *Digestive system* normal except for hyperæmia of areas of small intestine and two small areas of subperitoneal hæmorrhage on surface of two coils of intestine. *Other organs*, including *brain*, normal macroscopically.

At least 50% of total blood pigment present in blood expressed from lung after formalin fixation was carboxyhæmoglobin.

Microscopically.—Both lungs show free intra-alveolar capillary hæmorrhage over wide areas. For the most part hæmorrhages are deeply placed, but there are scattered areas of subpleural extravasation.

Case 4.—Girl, aged 13. Found dead in a public shelter which sustained direct hit by a bomb. Well covered, normally developed girl. Blood-stained frothy fluid coming from the nose. Hypostasis pink.

Frothy blood in *trachea* and *bronchi*. *Lungs:* posterior parts, deep purple; both lungs very congested with macroscopic areas of hæmorrhage, varying in size from 1·5 to 2 cm. across, throughout the substance, a few being subpleural. All *other organs* normal macroscopically.

At least 65% of total blood pigment present in fluid expressed from lung after formol-fixation was carboxyhæmoglobin.

Microscopically.—Outstanding change in lungs is capillary hæmorrhage into alveoli, massive in some of deeper parts of lung but present to lesser degree in subpleural areas. Also acute over-distension of respiratory bronchioles, atria and alveoli. At periphery of lung this acute emphysema has caused splitting of pleura with formation of microscopic bullæ. Some arterioles contain abnormal proportion of white blood-corpuscles, mostly polynuclear. Brain shows few free red corpuscles in pia, otherwise tissue is normal. Kidneys, liver and spleen show post-mortem changes only.

Case 5.—Woman, aged about 40. Found dead in a house demolished by a bomb. Obese. Hypostasis bright pink. Slight bruising of upper arms posteriorly. No other external marks of injury. Frothy mucus in mouth and upper air-passages.

Lungs: normal size with emphysema at margins; general congestion with some small scattered areas of hæmorrhage. *Heart and great vessels:* normal; post-mortem staining of interior of vessels. *Stomach and small intestine:* hyperæmic. *Liver, spleen, kidneys and brain:* normal.

At least 75% of hæmoglobin derivatives present in fluid expressed from fixed lung was carboxyhæmoglobin.

Microscopically.—Lungs show over-distension of alveoli with considerable amount of œdema; a few small areas of hæmorrhage in deeper parts. No subpleural hæmorrhage but pleura shows splitting and bulla formation in relation to the over-distended alveoli.

Case 6.—Woman, aged about 29. The mother of the child in case 7, whom she is said to have been holding in her arms. Found dead in a bombed house. Well-nourished. Superficial contusion of scalp and multiple lacerations of legs, arms and thighs. None of these injuries were severe or extensive. Surgical emphysema of tissues of neck, mediastinum and pericardium, and blood in tissues of mediastinum. Fracture of base of skull across sphenoid bone, with slight contre-coup injury in right occipital lobe of brain.

Both *lungs* showed some chronic emphysema and ill-defined areas of recent hæmorrhage with surgical emphysema of roots. *Other organs:* normal.

FIG. 1—Cut surface of lung in case 4, showing distribution of hæmorrhages which are most extensive in the deeper parts.

No evidence of carboxyhæmoglobin in fluid expressed from formol-fixed lung.

Microscopically.—Lungs show many areas of alveolar over-distension with associated hæmorrhages. These are mainly in deeper parts of lung though some are subpleural. In some regions there is hæmorrhage into very small bullæ on pleural surface. No evidence that these areas of pleural damage are in any relation to the ribs.

Case 7.—Male child, aged 1 year 10 months. Said to have been in mother's arms (case 6) when house was bombed. Well-nourished. Small contused and splinter wounds on left side of face, head, both legs and anterior surface of chest. Two small punctured wounds on chest, one of which had penetrated chest wall. Parietal pleura had not been opened.

Trachea and *bronchi* contained frothy blood; mucous membrane hyperæmic. *Lungs:* large areas of hæmorrhage in lower lobes posteriorly; small areas of hæmorrhage in

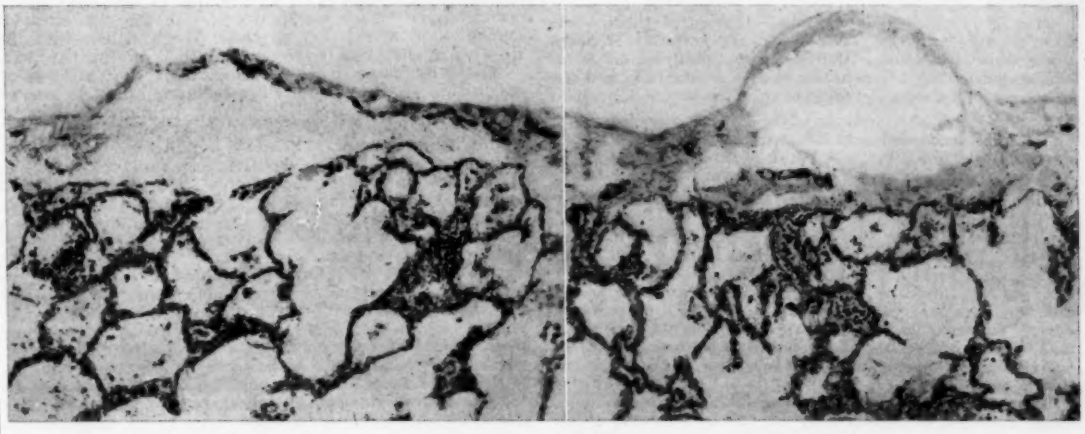

FIG. 2—Microphotograph of pleural surface of lung in case 4, showing acute vesicular over-distension and microscopic bulla formation on pleural surface.

both upper lobes and in middle lobe on right side. Surgical emphysema of *pericardium*. *Heart:* normal. *Stomach:* ruptured. Small areas of emphysema in upper part of *peritoneum*. *Liver:* normal, except for few small hæmorrhages posteriorly. *Other organs:* normal.

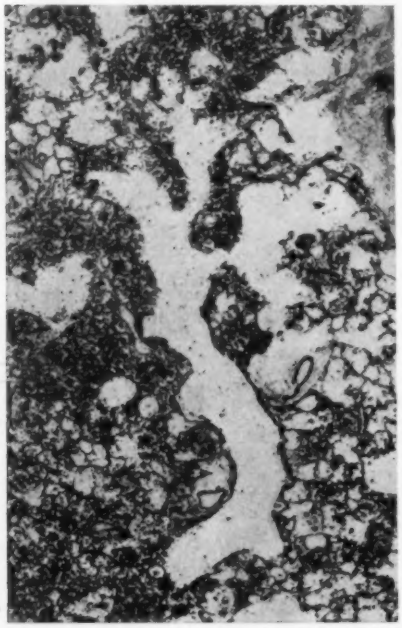

FIG. 3—Low-power view of lung in case 7, showing over-distension of respiratory bronchiole, infundibulum, and atria and alveolar hæmorrhage.

No evidence of presence of carboxyhæmoglobin in fluid expressed from formol-fixed lung.

Microscopically.—Lungs show acute vesicular over-distension with splitting of pleura and bulla formation in places. Massive hæmorrhage into alveoli, more severe in deeper parts of lung.

Case 8.—Man, aged about 50. Picked up dead in open 20–30 yards from large bomb crater. Bruising of left thigh and small lacerated wound of left elbow. Slight bruise on scalp in right frontal region. Fracture of spine between 5th and 6th cervical vertebræ with tearing of anterior ligaments; extravasation of blood into, and tearing of, anterior ligaments in lumbar region. Frothy blood-stained fluid in upper air-passages.

Lungs: slight hæmorrhage into anterior margins where there was chronic emphysema; old pleural adhesions at right apex with tuberculous scarring and recent acute extension of tuberculosis; recent acute tuberculous bronchopneumonia in left lung; few areas of hæmorrhage in both lungs on posterior aspect. *Heart:* old pericardial adhesions; slight atheroma of coronary vessels and some fibrosis of the myocardium. *Other organs*, including *brain*, normal.

No carboxyhæmoglobin found on spectroscopic examination of fresh blood.

Microscopically.—Acute lymphatic spread of tuberculosis from the old scar at right apex and acute tuberculous bronchopneumonia in left lung. Compensatory emphysema. Some hæmorrhage present but chronic disease is advanced and the relationship of the hæmorrhage to recent injury is difficult to assess.

The girls in cases 9 and 10 were found together in bed in a ground-floor room. A bomb had burst immediately outside the window. Both girls were buried under debris and one was stated to have been just alive when the debris was removed an hour after the explosion.

Case 9.—Girl, aged 17. Well-developed. Slight cyanosis present. No external marks of injury. Frothy fluid about the mouth. Frothy fluid in upper air-passages.

Lungs: normal size; hæmorrhages on pleural surface at anterior margins; some hæmorrhage into deeper parts. *Heart:* subpericardial petechiæ posteriorly; otherwise normal. Some congestion of *brain* but *other organs* normal.

No carboxyhæmoglobin found on spectroscopic examination of fresh blood.

Microscopically.—Lung shows congestion and some œdema. Over-distension of alveoli only at pleural surface. Little hæmorrhage into alveoli; fibrin formation in extravasated blood where present. Hyaline thrombi demonstrable in some of smaller vessels. Increased number of polynuclear leucocytes present in some vessels.

Case 10.—Girl, aged 14. Well-developed. Slight abrasions on outer side of left forearm and back of left hand. Slight bruising of scalp over frontal region. Slight cyanosis. Frothy fluid about the lips.

Lungs: dark and congested at both bases; some hæmorrhages and emphysema on pleural surface which in one area corresponded to the position of a rib.

No carboxyhæmoglobin found in fresh blood examined spectroscopically.

Microscopically.—Lungs show congestion and œdema. Little over-distension of alveoli. Some fibrin present in alveolar hæmorrhages. At the pleural surface corresponding to the "rib mark" there is subpleural hæmorrhage and rupture of underlying alveoli with formation of bullæ, some containing red blood-corpuscles. In the dilated blood-vessels at the base there is an increased proportion of polynuclear leucocytes and small hyaline thrombi are present.

DISCUSSION

In each of these ten cases some degree of capillary hæmorrhage into the lung was found. In the two cases in which death was considered to be due to compression asphyxia the hæmorrhage was relatively slight, but the capillary and venous congestion and œdema present were striking and the air-passages contained only a small amount of blood-stained fluid which was not "frothy." In the four cases in which death was considered to be due entirely to the effects of blast there was free capillary bleeding over large areas in which the respiratory bronchioles, atria and alveoli showed uniform and considerable over-distension. It is however, not quite clear that the hæmorrhage is the result of the rupture of alveolar walls previously and acutely dilated, for acute vesicular and interstitial emphysema is present in those parts of the lung which are free from hæmorrhage.

Subpleural hæmorrhages were not conspicuous in any of the cases in which death was presumably due to blast and the only case in which hæmorrhagic rib-markings were present in the pleura died from compression asphyxia. Hæmorrhage into the walls of smaller bronchioles was occasionally found but there was a conspicuous absence of bleeding into the walls of air-tubes larger than this. There was no suggestion that the hæmorrhages were grouped around the bronchial system. The microscopic subpleural bullæ appear to be produced by the detachment of the visceral pleura and its subjacent elastic tissue from the underlying lung by air escaping from ruptured alveoli. The most severe pulmonary hæmorrhages were found in case 7, an infant, and in case 4, a child of 13. The lesser rigidity of the young thoracic wall may therefore be the determining factor in the production of extensive pulmonary hæmorrhage. On the other hand, the hæmorrhages were minimal in the only case which was noticeably obese. As a general rule there was no fibrin formation in the blood extravasated into the alveoli. Clotting was detected in case 2 which survived for ten hours and in the two cases of compression asphyxia; in these three a considerable number of the smaller vessels contained hyaline thrombi.

The three cases in which there was a grave degree of saturation of the blood with carbon monoxide are of particular interest. Each showed pulmonary hæmorrhages of the same character as those found in the cases dying of blast alone. The most striking single difference between the two groups was the fresh pink colour of the hypostasis in the carbon-monoxide cases. In both groups the air-passages contained much frothy serous fluid. It appears that in all the carbon-monoxide cases the patient had sustained a severe degree of blast before inhaling explosion gas.

The amount of blood extravasated into the lung varied considerably, and for this reason, even taking into account the rapidity of production of the hæmorrhages, we do not consider that the pulmonary injury itself could fatally embarrass the circulation. We regard this lesion as a trustworthy indication that the patient has been struck at close range by a wave of high-pressure. It seems more likely that blast produces death by interfering with some vital tissue or centre in which, from the extreme rapidity of action, structural changes are unlikely to be found.

Identification and Estimation of Carboxyhæmoglobin in Formol-fixed Material (Dr. Jordan)

Carboxyhæmoglobin was found in the formol-fixed material of three of the cases, the proportion of the total blood pigment present as carboxyhæmoglobin being 50, 65 and 75%. The other pigments found were methæmoglobin and oxyhæmoglobin. It was obviously essential to investigate the effect of formol on the spectroscopic identification of carboxyhæmoglobin.

Preliminary qualitative experiments showed that formalin slowly converted oxyhæmoglobin and carboxyhæmoglobin into methæmoglobin. It was then necessary to eliminate any error which might arise in the estimation, by the reversion spectroscope, of carboxyhæmoglobin in mixtures of this pigment with methæmoglobin and oxyhæmoglobin. The alpha band of

OBSERVED WAVELENGTH (IN Å) OF α LINE OF OXY- OR CARBOXY-HÆMOGLOBIN IN MIXTURES WITH NEUTRAL FORMOL

Pigment and neutral formalin	Immediately	After			
		1 day	2days	3 days	4days
Carboxyhæmoglobin ..	5730	5743	5751	5764	5767
Oxyhæmoglobin	5774	5781	5775	5780	5786
Mixture of carboxy- and oxy-hæmoglobin ..	5750	5747	5754	5759	5764

carboxyhæmoglobin has a wave-length of 5720 Å. The band of methæmoglobin, wave-length 5795 Å, is too weak to cause much appreciable displacement, and it might be expected that the estimated amount of carboxyhæmoglobin would be greater than the real amount. It was therefore necessary to establish experimentally that the rates of change of oxyhæmoglobin and carboxyhæmoglobin into methæmoglobin were similar, so that no apparent rise in the carboxyhæmoglobin content could take place.

The spectroscopic picture showed a slow disappearance of the oxy- and carboxy-hæmoglobin (see table).

These figures suggest that the rates of conversion of carboxyhæmoglobin and oxyhæmoglobin into methæmoglobin are much the same.

It was found that the rate of formation of methæmoglobin varied considerably with the degree of access of the mixture to air. In specimens exposed to the air in layers 0·2 in. thick the change was complete within 24 hours, while in tubes filled with fluid and well corked the change was considerably slower. It follows that carboxyhæmoglobin in formol-fixed material will change into methæmoglobin at a rate depending on the ease of access to air. The values found for the carboxyhæmoglobin content represent minimal values.

The formalin used in fixing the specimens was neutral and the hæmoglobin derivatives would eventually have undergone total transformation into methæmoglobin. If formalin which had been allowed to become acid had been used the detection of carboxyhæmoglobin would have been complicated by the presence of acid hæmatin.

SUMMARY

Of ten fatal cases considered to have died from blast nine showed no fatal injury. In three a fatal degree of saturation of the blood with carbon monoxide was found. In two the cause of death was compression asphyxia.

The pulmonary lesion from fatal blast is described and its mechanism briefly discussed.

MEDICAL DEFENCE UNION: ANNUAL REPORT.—At its fifty-fifth annual meeting on Sept. 24 Mr. E. D. D. Davis (treasurer) took the chair in place of Surgeon Rear-Admiral E. Pearce Gould (president), deceased. In presenting the annual report Mr. Davis mentioned that more new members had come in last year than ever before. He referred to the distinguished service rendered by the late president and to the loss sustained by the union through his death. For the ensuing year Dr. Henry Robinson, Miss E. Bolton, Mr. Davis and Colonel St. J. D. Buxton, R.A.M.C., were elected members of council. Later Colonel Buxton was chosen as president.

ALCOHOL INJECTION OF THE GASSERIAN GANGLION FOR MIGRAINOUS NEURALGIA

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ALCOHOL injection for paroxysmal trigeminal neuralgia (tic) has now become a standard method of treatment, and though lasting cures from injection of the separate nerve trunks are uncommon yet if the gasserian ganglion is properly injected through the foramen ovale the results are likely to be as permanent and complete as those of surgical resection of the sensory root.

CLINICAL PICTURE OF MIGRAINOUS NEURALGIA

Since 1912 I have used the term migrainous neuralgia to describe a form of migraine or unilateral headache which mostly affects the front of the head on one side around the eye, temple and upper jaw, occasionally spreading to the back of the head, and only rarely to the lower jaw. I have seen a considerable number of these cases, which differ from ordinary migraine in the absence of the preliminary warnings of visual spectra, hemianopia, tinglings of lips and tongue or hand; and the rarity of nausea or vomiting. These patients have often suffered from typical migraine in childhood, or migraine may be frequent and severe in other members of their families.

The pain is in most cases entirely limited to one side; in a few the bouts of attacks may be on either side, though each bout is limited to one side. Very occasionally the pain, after ceasing on one side, may attack the other. The duration and frequency of the attacks varies much. Some patients suffer daily for a month or six weeks every year, while in others the attacks at first may be at intervals of weeks and gradually become more common until they occur three or four times a week, lasting most of the day and entirely crippling the patient's activities. The duration of the individual attacks also varies widely, lasting 24–48 hours in some, and as short a time as 10 minutes in others. Many of my patients have had from twelve to twenty attacks in the 24 hours. This type of neuralgia is especially liable to be mistaken for paroxysmal trigeminal tic, but differs from it in displaying no "trigger zones" (areas sensitive to light touch); nor is the attack of pain brought on by movements of the face in eating and talking, or by handling the face. Moreover, the attacks of migrainous neuralgia commence much earlier in life, commonly in the twenties. Some patients may notice, as in migraine, an unusual feeling of "fitness" or voracious hunger for some hours before an attack.

A characteristic attack will begin, often suddenly, as a violent pain in the temple, in the eyeball, or behind the eye, and will spread around the eye above and below and into the upper cheek and side of the nose. The eye often becomes very bloodshot and lacrimates, and may feel as if it is "being pulled out and hammered." The agony is often extreme and I have known patients dash their heads against a wall in desperation. It is not a lancinating, red-hot neuralgia lasting only a few seconds and recurring every few minutes, as in trigeminal tic, but a pain which persists, often for many hours, though it may occasionally be over in ten minutes. A strong wind or severe worry may start an attack. Many of my patients had previously been through the hands of oculists, dentists, and ear, nose and throat surgeons, had been furnished with glasses, and had had dental extractions and various sinus and nasal operations performed without benefit.

PATHOLOGY AND TREATMENT

Although the pathology of migraine and migrainous neuralgia is not certainly known there is strong presumptive evidence of an intracranial vasomotor disturbance. In typical ophthalmic migraine accompanied by teichopsia or hemianopia it seems that an initial spasm or claudication of the posterior cerebral artery must be a factor. In the migrainous neuralgias which I have described the pain is more anterior, in eyeball, temple and cheek, and nausea and vomiting are rare and ocular signs nearly always absent. It seems probable that anterior vessels are involved in the claudication—possibly branches of the internal carotid and the middle meningeal artery—because the pain appears to be reflected along the recurrent meningeal nerves of the three trigeminal branches. It is probably owing to the anæsthetic effect produced on these meningeal branches by gasserian injection that permanent cure may be obtained. There is commonly excessive tenderness in the temple during the attack, and some cases have been temporarily cured for a year or more by an alcoholic piqure down to the bone in the tender area. Others have obtained complete and immediate relief, lasting for many months, by alcohol injection of the supraorbital or infraorbital nerve. Such temporary relief may be due to a reflex effect of the injection on the trigeminal system.

Since 1931 I have treated 29 of these cases by injection of the gasserian ganglion with encouraging results, 19 being completely cured, and 5 much improved. In the remaining 5 the results at first seemed to be good, but ultimately the attacks returned, though less violently. These results may be compared with the treatment of trigeminal tic by either sensory root resection or ganglion injection. The proportion of cures—about two-thirds of the total—is not as high as in trigeminal tic; but the alternative is continual doping with luminal or other sedative and analgesic drugs.

ILLUSTRATIVE CASES

CASE 1.—A married woman, aged 46, seen in April, 1911. Had suffered from spasms of neuralgia in head since the age of 16, always in summer. Pain began gradually outside right eyebrow and spread across eye, which became blood-red; pain stabbing for ¼ hour. Might have several attacks in a night. Alcohol piqure given into the temple, down to bone. Complete relief for eight months.

CASE 2.—A man, aged 33, seen in May, 1914. Since boyhood had been subject to recurrent headaches; was suddenly attacked while out shooting in October, 1912, with blinding pain in the right eyeball and at back of eye, lasting half an hour, the eye being bloodshot, with small pupil. He said the pain felt as though someone had pulled the eye out and was hammering it. This recurred twice daily for a month and then disappeared for twelve months; pain then returned suddenly, worse than before, twice daily; he was "beside himself with agony." The attack again lasted for a month. After this the pain did not disappear altogether, but occurred once or twice a week for eight months, when they again recurred severely twice daily. It was during this period that I saw him (May, 1914) and injected the infraorbital nerve with alcohol. This caused typical infraorbital anæsthesia, with immediate cessation of the pain and there was no further recurrence for 15 months.

These cases illustrate the method I used first of local alcohol piqure with infraorbital or supraorbital nerve injection. In 1920 I began to use gasserian injection in the hope of producing permanent relief.

CASE 3.—A man, aged 50, seen in November, 1934. In 1928 he began to have violent sudden neuralgia, left eyebrow and cheek to back of head lasting 1–2 hours; eye felt as if being forced out. Pain usually began at 1 A.M. In 1931 partial gasserectomy, done in Cape Town; had much pain for four months, then none for eighteen months. Since then pain had become more frequent and severe, always left-sided. Attacks nightly, beginning at 2–3 A.M. and sometimes three or four in day as well, very severe at back of eye to back of head and upper cheek, stinging in nose with stabbing pains like lightning-flashes on top of a chronic ache, lasting for several hours. Described his pains as "hellish torment." In March, 1938, I injected the left gasserian ganglion by the lateral route. Result: total anæsthesia, still unaltered 4 months later, and "not a flicker of pain" since. Keratitis began but subsided with boracic eye-bath and liquid paraffin instillations.

CASE 4.—An unmarried woman, aged 25. Six years neuralgic headaches right temple to back of eye, lasting all day once a week. Occasional nausea. Pain now spread along upper jaw. Extraction of unerupted wisdom tooth gave no benefit. In October, 1938, pain daily for several hours. Sinuses normal. Femergin and Bellergal both failed to relieve. I injected ganglion in November, 1938, during painful attack. Pain cleared at once. Total anæsthesia of upper two divisions of fifth nerve, slight anæsthesia third division; next day slight recovery of second division. Twelve months later she wrote: "Injection complete success; only an occasional slight stab, no inconvenience." She thinks stabs indicate what would have been bad attacks without the numbing of the nerve.

CASE 5.—An unmarried woman, aged 32. Seen in November, 1939. Ten years' history of left fronto-parietal headaches. Tonsils and many teeth extracted without benefit. Sinuses normal. Attacks at first once a week, now every 3½ hours. Took 8 or 9 aspirin tablets daily. Pain began over left eyebrow, and became more and more severe; eye gets congested and lacrimates. Injected ganglion in December, 1939, giving total trigeminal anæsthesia. Complete relief. Still quite well in June, 1940.

SUMMARY

A violent type of migraine, which I call migrainous neuralgia, is distinguished from migraine by the absence of premonitory symptoms and the rarity of subsequent nausea or vomiting, and from trigeminal neuralgia by the absence of trigger zones and the longer duration of attacks. Five cases are described which illustrate the characteristic symptoms and treatments I have employed since 1911—first, local alcohol piqure and infraorbital or supraorbital alcohol injection, giving relief for several months, and later alcohol injection of the gasserian ganglion, giving more lasting and probably permanent cure. Out of 29 cases 19 were completely relieved and 5 others much improved.

MANAGEMENT OF CEREBROSPINAL FEVER TREATED WITH SULPHAPYRIDINE

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THE first case of cerebrospinal fever admitted to a R.A.F. hospital at the beginning of this year's epidemic developed agranulocytosis during treatment with sulphapyridine, and died a fortnight after all signs and symptoms of meningitis had disappeared. A series of 45 consecutive cases was therefore used to find the best method of treatment. They were all treated with sulphapyridine, without any serum or antitoxin, and observations were made of changes in the clinical state and in the bacteriological, cytological, and chemical characteristics of the cerebrospinal fluid and blood, including the sulphapyridine content in two contrasting groups. There were no further deaths and every patient returned to full duty both on the ground and in the air. Clinical details of this series have been described elsewhere (Brinton 1940).

The subjects were all males, their ages ranging from fifteen to thirty, and averaging twenty years, and they had been admitted to hospital from seventeen different centres. Prior to the illness they had all been in excellent health. Treatment was begun within 24 hours of the onset of symptoms in 4 cases, on the second day in 17, the third day in 9, the fourth day in 6, and later

than that in 5 cases. In 4 a definite history of the onset was not available. In 8 patients symptoms of septicæmia had been present for from two to fourteen days before the onset of meningitis; 6 of these had involvement of joints and 3 had tender subcutaneous nodules. The severity of the illness varied greatly and in assessing the result of treatment this factor was considered in contrasting groups of patients.

On admission 10 patients were deeply comatose and 11 showed definite clouding of consciousness; the remaining 25, though not necessarily completely alert, could give a history and coöperate in treatment. All complained of headache on regaining consciousness and in half of the patients it was distressing; all had neck rigidity and in all except 4 Kernig's sign was positive; 34 had vomited repeatedly before treatment was begun. A characteristic petechial eruption was present in 29 and large ecchymoses and conjunctival and mucosal hæmorrhages was also seen.

Local nervous signs were unusual. One patient had a transient unilateral extensor plantar response on admission and in 6 the tendon jerks were obtained with difficulty. In another 6 there were defects of extra-ocular movement, usually very slight. These included two partial 6th and one partial 3rd nerve palsy, ptosis, diplopia, and defective convergence. There was unilateral facial weakness in 4 patients, and 3 had transitory deafness in one ear.

Meningococci were seen in direct smears or 24-hour glucose-broth cultures in 36 cases.

GENERAL MANAGEMENT

The nursing and management of the cases did not differ greatly from that described by previous writers (Banks 1940). Many patients were already dehydrated before admission and glucose drinks were given in all cases. Rectal salines were occasionally used, but parenteral methods of administration were not found necessary in any case.

In an early group of patients nausea and vomiting were associated with constipation during sulphapyridine treatment and subsequently all patients taking the drug were given an enema if they had not passed a motion for 48 hours.

Restlessness was allayed by chloral hydrate in doses up to gr. 30 by mouth, or if this was impracticable through nausea or lack of coöperation by paraldehyde ʒ iv per rectum. In some very restless patients, and in those who had a severe headache and were sleepless, morphine sulphate gr. ¼ was effective and without ill effect. Barbiturate analgesics were also used.

SULPHAPYRIDINE

Dosage.—Sulphapyridine (M. & B. 693) was used in all cases. Whenever possible the drug was given by mouth in doses similar to those recommended by Hobson (1938) and Banks (1940). It soon became clear that patients would tolerate a very large loading dose with absolute safety. Only thus can the concentration of sulphapyridine in the blood and cerebrospinal fluid be raised rapidly to an adequate level. Thereby the duration of meningeal symptoms and the course of chemotherapy may be shortened, and the likelihood of toxic symptoms ranging from simple nausea and morbilliform rashes to severe agranulocytosis reduced.

The dosage ultimately considered the most favourable was as follows:—

Day	Dosage	Daily total
1st	2 g. on admission	—
	2 g. 2-hourly for 2 doses ..	—
	1 g. 4-hourly	Maximum of 10 g.
2nd	1 g. 4-hourly	6 g.
3rd	1 g. 6-hourly	4 g.
Thereafter ..	1 g. 8-hourly	3 g.

The daily dosage was maintained at 3 g. until a total of 30 g. had been given, when a differential white-count was done. All signs of meningeal irritation had usually disappeared at this stage—that is, about a week from the onset of treatment—but if they had not, and if the number and type of polymorphonuclear leucocytes were satisfactory, treatment was continued until the last trace of neck rigidity had disappeared. In this series the white-count never fell below 8000 per c.mm. The total dosage ranged from 32 to 48 g., being usually 34–38 g.

Probably a smaller loading dose and shorter period of administration and a smaller total dose would prove sufficient in most cases. Hobson (1938) has shown that smaller concentrations of sulphapyridine than were reached in this series are bacteriostatic, but since no serious complication of chemotherapy arose we think it was reasonable in so serious a disease to use the larger dosage, in order to be certain of achieving an adequate concentration in the cerebrospinal fluid in all cases. Similarly the clinical and laboratory signs of infection disappear so rapidly with the large loading dose used that continuation of treatment after the first few days is more judicious than essential.

Mode of administration.—Tablets of sulphapyridine were usually crushed in water and taken by mouth. When there was nausea 1% mucilage of tragacanth as a vehicle was extremely effective in preventing vomiting. With persistent vomiting or deep coma a solution of sodium sulphapyridine was given deeply into the gluteal muscles. This was discontinued because its extreme alkalinity caused permanent changes in 2 patients, who complained of stiffness and weakness in the corresponding legs. Examination in hospital later revealed slight wasting of the calf with an absent ankle-jerk and partial upper sacral anæsthesia. Four months after these men had returned to duty there was no sensory loss, but the ankle-jerk was still absent and the calf a little thin. The stiffness and weakness improved greatly under physiotherapy. In 1 case the injections were incorrectly given, the chemical invaded the subcutaneous tissue and two large indolent sloughs developed. When vomiting occurred later in the series, sulphapyridine was temporarily replaced by the same dose of sulphanilamide. This was successful, for when sulphapyridine was begun again there was never any recurrence of vomiting.

LUMBAR PUNCTURE

In all cases lumbar puncture was performed on admission to establish the diagnosis. In the first 15 cases it was repeated at least once daily until the pressure had fallen to normal or the cerebrospinal fluid had become clear. From three to seven punctures were made, four being usual, and each time sufficient fluid was removed

TABLE I—CONDITION ON ADMISSION OF PATIENTS WHO HAD (1) A SINGLE DIAGNOSTIC LUMBAR PUNCTURE AND (2) A DAILY PUNCTURE

	Lumbar puncture: Daily	Lumbar puncture: Single
Number of cases	20	25
Days ill before admission	2·4	2·4
Consciousness :—		
1. Deeply comatose	20%	23%
2. Clouded	30%	13%
3. Relatively clear	50%	62%
Headache	No apparent difference	
Vomiting		
Meningeal signs		
Cranial nerve palsies	35%	15%
Rash	70%	62%
Toxic signs	55%	46%
Meningococci recovered	94%	77%
Septicæmia	20%	16%

to reduce the pressure to 100 mm. of water. Undoubtedly the headache was sometimes eased and one patient rapidly became more alert after drainage of cerebrospinal fluid, but the general response to sulphapyridine was so rapid that repeated lumbar puncture seemed unnecessary. Consequently a group of clinically similar patients was treated with sulphonamides alone, when one diagnostic puncture had been made, and later another group was punctured daily. The condition of the two groups on admission is contrasted in table I. This shows that the two groups, although small, were strikingly similar, that receiving daily lumbar puncture having slightly more generalised toxic and septicæmic signs. As far as possible the two groups were unselected samples of the epidemic.

RESPONSE TO TREATMENT

Clinical response.—Table II shows the average duration in days of early meningeal symptoms and signs under the two types of treatment. As might be expected there was no appreciable difference in the relative duration of general systemic concomitants of the disease, such as signs of toxicity, involvement of joints and herpes febrilis. There was one example of herpes zoster in each group.

All the patients were fully re-examined within twenty-four hours of their discharge from hospital. There were no visible cranial-nerve palsies in any patient. In the first group 2 patients and in the second group 1 patient had relative bilateral deafness to high tones, and in the second group 1 patient had slight unilateral deafness.

TABLE II—DURATION OF EARLY MENINGEAL SYMPTOMS AND SIGNS (DAYS)

	Lumbar puncture	
	Daily	Single
Unconsciousness	2·7	2·0
Headache	5·4	3·1
Neck rigidity	4·8	4·1
Vomiting	Unrelated to procedure	

After a month's sick leave all the patients returned to duty. Those engaged in flying returned to flying duties. At present 42 patients have been re-examined more than three months after returning to duty. There have been no sequelæ of cerebrospinal meningitis in any of these patients. Slight stiffness of a leg in 2 patients has already been referred to, and there was one mild anxiety state.

Cerebrospinal fluid.—Specimens of cerebrospinal fluid and blood were taken from patients in each group two hours after the last dose of sulphapyridine. With the patient recumbent and relaxed the average final pressure in the group having repeated punctures was 180 (range 70–270) mm. of water and in those who had been treated without drainage of cerebrospinal fluid 150 (range 110–250) mm. of water. In both groups there was a lymphocytic pleocytosis with an average of about 50 cells (range 10–1900) per c.mm. The fluid was invariably sterile on culture.

In the group which received repeated drainage the clinical signs of meningeal irritation were found to be a more delicate index of the control of the disease than were cell-count or sugar content of the cerebrospinal fluid, and the clinical state was unrelated to abnormal levels of intracranial pressure.

Sulphapyridine content.—In the group of cases receiving repeated drainage the cerebrospinal-fluid pressure was maintained at a relatively low level. If sulphapyridine is filtered passively into the fluid from the blood this procedure might have facilitated its passage. On the other hand, if the drug passes as part of the active secretion of the cerebrospinal fluid (Flexner 1934) the difference in pressures in the two groups should not affect its relative concentration in the fluid. Again, removal of large volumes of cerebrospinal fluid heavily loaded with sulphapyridine might result in a considerable lowering of the sulphapyridine content through replacement by dilute cerebrospinal fluid. In order to find whether repeated drainage materially affected the sulphonamide concentration in the cerebrospinal fluid estimations of the sulphapyridine content were made in the simultaneous specimens of fluid and blood, using Marshall and Litchfield's (1939) colorimetric method. The detailed results are shown in table III.

TABLE III—SULPHAPYRIDINE CONTENT OF CEREBROSPINAL FLUID (C.S.F.) AND BLOOD

Cases with repeated drainage			Cases without drainage		
Total content (mg. per 100 c.cm.)		Ratio C.S.F./ blood content	Total content (mg. per 100 c.cm.)		Ratio C.S.F./ blood content
Blood	C.S.F.		Blood	C.S.F.	
9·6	4·6	47·1	6·6	3·3	49·3
10·3	2·5	24·7	18·0	3·9	21·7
3·8	1·8	42·2	3·3	2·1	62·1
5·9	1·7	29·2	5·5	3·2	59·7
5·0	2·2	43·5	3·2	1·5	48·2
3·3	1·5	47·6	4·2	2·1	50·5
2·3	1·4	63·0	13·6	7·1	52·9
2·5	1·4	58·0	8·4	4·8	56·2
2·0	1·1	53·5	4·2	3·6	85·2
4·4	2·1	47·5	5·8	4·0	67·4
5·0	2·4	48·3	7·9	5·3	67·6
2·2	0·8	37·8	6·6	2·8	42·9
2·1	0·7	36·6	4·6	3·2	69·1
			6·3	4·3	67·1
			5·8	4·4	75·3
			5·6	3·7	65·3
			6·1	5·0	81·3
			5·4	4·2	77·6

The absolute value of the cerebrospinal fluid content of sulphapyridine depends directly on the blood content, which is in turn related to the vagaries of absorption of the drug from the alimentary canal (Allott 1938). This figure is therefore of no value in individual cases in comparing the efficacy of the two methods of treatment. In a series of cases it has greater significance. On the other hand the ratio of cerebrospinal fluid and blood contents is a true index of the efficiency with which the drug is transferred through the choroid plexus. This ratio in the two groups, expressed as C.S.F. content in mg. per 100 c.cm./blood content in mg. per 100 c.cm., is therefore included in the tables.

TABLE IV—AVERAGE OF FINDINGS IN TABLE III

	Lumbar puncture	
	Repeated	Single
Number of estimations	13	18
Average C.S.F. content of sulphapyridine (mg. per 100 c.cm.)	1·9	4·0
Average ratio C.S.F./blood content	42·2	59·2

The results in table III show the wide variations in absorption of sulphapyridine into the blood, previously commented on by Allott (1938). Such wide variations as 2·9 and 18·05 mg. per 100 c.cm. in the blood occurred under standard conditions of administration, collection, and determination. It is evident from the detailed results and from the average determinations in table IV that irrespective of the blood level the absorption of sulphapyridine into the cerebrospinal fluid was more efficient in those cases where the normal mechanism of cerebrospinal fluid formation and removal was not interrupted.

DISCUSSION

The end-results in this series should not be contrasted with those obtained in the same epidemic in the civilian population. Many factors contributed to the return of every patient to duty. The duration of the disease before beginning treatment was relatively short. The lowest mortality in all epidemics always occurs in the age-group represented by this series. Lastly, all the men were in excellent physical health before the infection. But even if allowance is made for these factors the results are good and the therapeutic procedure is proved to be adequate.

The absence of sequels in patients treated without drainage is significant, for failure to remove the infected purulent cerebrospinal fluid did not cause any disability, although basal adhesions causing internal hydrocephalus and cranial nerve palsies were in the past related to accumulation of pus in the basal cisterns. An added justification for the abandonment of routine therapeutic lumbar puncture is that the cerebrospinal fluid was clear in all cases at the end of treatment, and the cell-count was no higher in those cases which had not been drained, while the pressure was actually lower. It is plain that with bacteriostasis the cerebrospinal fluid can return almost to normal in a few days. In one case the cell-count actually fell from over 20,000 polymorphs per cu. mm. to less than 20 cells (lymphocytes) in an otherwise normal fluid in seven days, without any drainage.

Great importance has been attached to a reduction in intracranial pressure, but recent experimental work (Williams 1939) has shown that high intracranial pressure alone does not necessarily cause cerebral damage. In all but 3 of the group treated without puncture the pressure had fallen to within normal limits at the end of treatment, compared with an abnormally high intracranial pressure in 6 of the other group. The patients whose intracranial pressure remained high were clinically normal and had no complaints. It is generally accepted that lumbar puncture may cause temporary relief of headache and may occasionally produce remission of the meningeal symptoms or diminution in the depth of unconsciousness, and when it can be performed without distress to the patient it may sometimes be justified for symptomatic relief alone. But with chemotherapy the period of grave illness is so short and the difficulty in

performing lumbar puncture in the first few days is often so great that we doubt whether drainage of the cerebrospinal fluid will remain a routine treatment. No rule can of course be made to cover exceptional cases.

Neither the high cerebrospinal-fluid pressure nor the absence of artificial drainage prevented the passage of sulphapyridine through the choroid endothelium into the cerebrospinal fluid, as the relevant C.S.F./blood ratios indicate. It seems that the concentration of sulphapyridine in the cerebrospinal fluid maintains a higher level if the normal flow and absorption of fluid is undisturbed by repeated drainage. The concentration of sulphapyridine under these conditions is more than is required for adequate bacteriostasis (Hobson 1938), whereas it was distinctly low in the patients whose cerebrospinal fluid was repeatedly removed.

There is only one satisfactory explanation for the lower concentration of sulphapyridine in the cerebrospinal fluid collected after repeated drainage. It is probable that fresh fluid is rapidly secreted through the inflamed hyperæmic choroid plexus. The relatively large molecule of sulphapyridine cannot pass from the blood through the endothelial lining with sufficient ease to maintain a high concentration in fluid that is being rapidly replaced. That such difficulty exists is shown by the observation that whereas the ratio of sulphanilamide in the cerebrospinal fluid to that in the blood approaches unity the corresponding ratio for sulphapyridine is only 48% under normal conditions and 56% in the presence of meningitis (Hobson 1938). Thus repeated drainage results in dilution of the loaded cerebrospinal fluid with newly secreted fluid of low content, the fluid lagging behind the blood in its absorption of sulphapyridine, so that further fluid is removed before the maximal concentration can be re-established.

These observations suggest that full doses of sulphapyridine over a few days ensure a sufficient absorption of the drug for the disease to be controlled, for the cerebrospinal fluid to return to normal, and for the patient to regain perfect health in minimal time without any lumbar puncture.

SUMMARY

Forty-five consecutive cases of epidemic cerebrospinal fever in young adults have been used to investigate the best method of administering sulphapyridine. All the patients have returned to duty in the R.A.F., and have remained free from any sequels. The concentration of sulphapyridine in the cerebrospinal fluid was higher in a group treated without thecal drainage than in those in which repeated lumbar puncture was performed. The significance of this is discussed in relation to the absorption of sulphapyridine. It is concluded that when adequate doses of sulphapyridine are given the disease can be effectively controlled without therapeutic lumbar puncture.

We are indebted to Dr. E. A. Carmichael for the use of the laboratories of the clinical research unit at the National Hospital, Queen Square; to Mr. G. A. Stroud, who carried out the sulphapyridine determinations in those laboratories, and to the Officer Commanding Princess Mary's R.A.F. Hospital, Halton, for permission to publish the data.

REFERENCES

Allott, E. N. (1938) *Lancet*, **2**, 13.
Banks, H. S. (1940) *Proc. roy. Soc. Med.* **33**, 555.
Brinton, D. (1940) Cerebrospinal Fever, Edinburgh. In press.
Flexner, L. B. (1934) *Physiol. Rev.* **14**, 161.
Hobson, E. G. (1938) *Lancet*, **2**, 1213.
Marshall, E. K. and Litchfield, J. T. (1939) *Science*, **90**, 85.
Williams, D. J. (1939) *Brain*, **62**, 321.

SULPHATHIAZOLE IN MALARIA

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IN our previous communications (THE LANCET, 1938, **2**, 79; and 1939 **1**, 1382) we published charts showing the antimalarial activity of Prontosil Red tablets, Proseptasine, and sulphapyridine. Since each of these three compounds contains the group $:N.C_6H_4.SO_2.NH.$, we expected to find that sulphathiazole would have a similar action.

Fig. 1 illustrates the effect of sulphathiazole on the rigors and parasites in a general paralytic inoculated with benign tertian malaria on June 3, 1940. Fig. 2 shows the fluctuations of benign tertian parasites in another general paralytic from whom all antimalarial treatment was withheld until after the eleventh rigor. This chart was chosen from our records as a control illustration because it closely resembles the first up to the point at which sulphathiazole was given.

The maximal daily dosage of sulphathiazole was 2 g. thrice daily at intervals of four hours. The patient vomited three hours after the second dose of 2 g., on July 28, but the subsequent doses caused no further complications.

Since the patient whose chart is shown in fig. 1 had a rigor on three consecutive days before the first dose of sulphathiazole, it seems highly improbable that the subsequent spacing of the remaining three rigors was spontaneous. Moreover, the parasite count fell from 90 to 4 per hundred fields and remained at a fairly low level for nine days before the quinine was given. There was no history of previous malaria or of residence abroad, and three other patients subsequently inoculated with the same strain have reacted normally. Hence there was no evidence of any tendency for the malaria to abort without treatment, such as might have happened with a partially immune host or with a "tired" strain.

On the other hand, our previous reports showed that the parasites could be temporarily eliminated from the blood-stream by even smaller doses of the other sulphonamides already mentioned. The relatively rapid excretion of sulphathiazole (see THE LANCET, 1940, **1**, 883), however, may be responsible for its failure in this respect.

Our thanks are due to Dr. J. D. Silverston for permission to publish this case, to Dr. M. B. Milne for her coöperation, and to Messrs. May and Baker Ltd. for supplying the sulphathiazole (M. & B. 760).

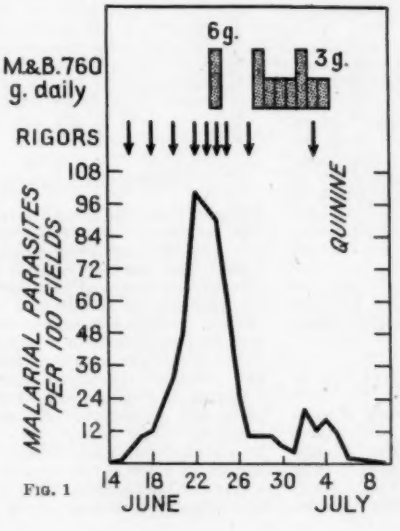

FIG. 1

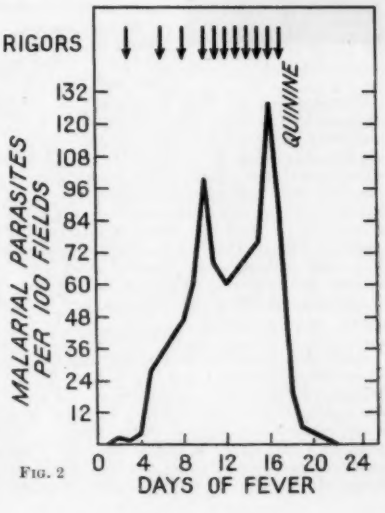

FIG. 2

ANDROGEN AND PREGNANDIOL EXCRETION IN HYPERTRICHOSIS

By Raymond Greene, D.M. Oxfd
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A woman of 26, after a normal childhood and pubescence, had begun at the age of 19 to show an excessive growth of hair. The growth had increased, especially in the last two years, until it had become stationary a few months previously. Menstruation had begun at 13 and had continued regularly with a loss for five or six days every twenty-seven or twenty-eight days. There was occasional slight dysmenorrhœa. She had never been ill, her appetite was good, bowel action and micturition normal and weight constant. Her father, mother and one sister were alive and well and there was no family history of endocrine disorder.

She was of medium height, with a slim figure and feminine contours (fig. 1). Her skin was sallow, as it had always been. The breasts were small but normal, except for deeply pigmented nipples and areolæ. The whole body was more than normally hirsute. The eyebrows were thick and the sides of the face, upper lip and chin were covered with thick, black, coarse hair (fig. 2). The axillary hair was excessive and the pubic hair luxuriant and of male distribution, a fact not well shown in the photograph. The legs and forearms were as hairy as those of an average adult man. There were no striæ atrophicæ. The skin between the hairs was soft and normal. She was a virgin. By rectal examination the pelvic organs were found to be normal. No other abnormalities were found on examination. The blood-pressure was 122/70 and the pulse-rate 72. Psychologically she was heterosexual. Though naturally unhappy about her appearance, she had made a commendable adjustment and did not allow it to occupy her thoughts unduly. She had a "boy friend" whom she hoped to marry one day.

Fig 1

The urine contained no sugar or acetone. The glucose-tolerance test (Dr. N. F. Maclagan) showed a fasting blood-sugar of 100 mg. per 100 c.cm. After 50 g. of glucose the figures in successive half-hours were 170, 180 (at which point a trace of sugar was present in the urine), 140, 100. The blood-count was as follows: hæmoglobin, 102%; red cells, 4,900,000; colour index 1·0; white cells 5200 (polymorphs 4316 (83%), basophils 52 (1%), lymphocytes 572 (11%) and monocytes 260 (5%)). Pyelography and adrenalography (Mr. F. A. d'Abreu) showed no abnormality. The adrenals were not very clearly shown. The urea-concentration test was normal.

Estimations of the excretion of androgens and of pregnandiol were performed by Dr. R. K. Callow at the National Institute for Medical Research. A preliminary examination for androgens in a 24-hour specimen of urine was done. Later, the total urine over a period of a month was collected; toluene was used as a preservative and extraction was carried out with as little delay as possible. Half the urine was used for 17-ketosteroid assay by the method of combined hydrolysis and extraction and colorimetric assay, and the other half for sodium pregnandiol glucuronidate assay by the method of Venning (1938). The results are shown in the table.

DISCUSSION

Androgen excretion.—The normal range of excretion of 17-ketosteroids is 2·5–12·5 mg. a day. The patient's values varied about a mean of 19 mg., being always above the usual limits for a normal woman and sometimes exceeding double this figure. The rise in the middle of the cycle is not statistically significant. It is reasonable, therefore, to assume some degree of hyperplasia of the adrenal cortex apart from clinical evidence. On the other hand, no patient with an adrenal tumour confirmed by operation or post-mortem examination has given a figure below 40 mg. per diem. It was therefore decided, taking her psychological normality into consideration, that laparotomy should not be urged.

Pregnandiol excretion.—The pregnandiol recorded as "trace?" was separated in amounts too small to be definitely identified. Venning and Browne (1937) and Venning, Henry and Browne (1937) have shown that sodium pregnandiol glucuronidate is absent from the urine of normal women during the follicular phase of the menstrual cycle but is present during part or the whole of the luteal phase. Since it was not present in the urine of my patient at any time of the cycle it may be presumed that, in spite of the apparent regularity of menstruation, ovulation did not occur during this particular cycle. Unfortunately the war has made it impossible to confirm this deduction for other cycles by endometrial biopsy.

Fig. 2

That a relationship exists between the adrenal glands and progesterone metabolism is shown by a number of observations. Gaunt and Hays (1938) and Fisher and Engel (1938) have reported that it is possible to prolong the life of adrenalectomised ferrets and rats by means of progesterone, the animals dying when the injections were discontinued. A substance having progestational effects was obtained from the adrenals by Engelhart (1930) and Callow and Parkes (1936). A substance biologically and chemically identical with progesterone was isolated from ox adrenals by Beall and Reichstein (1938) and Beall (1938). Finally Venning, Weil and Browne (1938) have reported two cases of "virilism" in which the excretion of sodium pregnandiol glucuronidate was increased. One excreted 12 mg. a day for seven days before the removal of a carcinoma of the adrenal cortex, but none after the operation. No corpus luteum was found at autopsy. The other, whose left adrenal gland was hypertrophied and whose ovaries were small and apparently without corpora lutea, excreted 20–30 mg. a day for two weeks. The second case, of which details are not given, differed from mine in that she had never

Date	Period (days)	Volume	pH	17-Ketoster. (mg. per 24 hr.)	Pregnandiol
Previous test					
Dec. 10–11, 1939 ..	1	1·7	5·5	22	No assay
Complete month					
Mar. 13–16, 1940 ..	3	1·7	6·0	16	Trace ?
16–19 ..	3	2·2	5·5–6·5	18	0
19–21 ..	2	2·6	6·0	26	0
21–23 ..	2	2·3	5·5–7·5	22	0
23–25 ..	2	2·3	6·0	16	0
25–28 ..	3	5·2	6·5	21	0
28–31 ..	3	3·2	6·0	17	Trace ?
Mar. 31–Apr. 2, 1940 ..	2	2·4	5·0–6·5	21	0
2–5	3	3·5	5·5–7·0	16	0
5–8	3	3·8	5·0–6·0	20	0
8–10.. ..	2	2·5	5·5–7·5	18	0

"Menstruation" occurred March 8–12 and April 4–9.

menstruated. The results in my case suggest that progesterone was being produced neither from the ovaries, owing to the absence of ovulation, nor from the adrenals, in spite of hypertrophy.

SUMMARY

A case of adrenal hypertrophy is described in which the clinical diagnosis is confirmed by the assay of male hormone excretion. The patient excreted no sodium pregnandiol glucuronidate, from which fact one may assume that no progesterone was excreted by her adrenal glands.

I wish to thank Mr. Aubrey Goodwin for referring the patient to me, Dr. R. J. V. Pulvertaft for the photographs and Dr. Callow for the assays and much helpful advice.

REFERENCES

Beall, D. (1938) *Biochem. J.* **32**, 1957.
— and Reichstein, T. (1938) *Nature*, **142**, 479.
Callow, N. H., Callow, R. K. and Emmens, C. W. (1938) *Biochem J.* **32**, 1312.
— — — and Stroud, S. W. (1939) *J. Endocrinol.* **1**, 76.
Engelhart, E. (1930) *Klin. Wschr.* **9**, 2114.
Fischer, A. and Engel, M. (1938) *Rev. Franç. Endocrinol.* **16**, 400.
Gaunt, R., and Hays, H. W. (1938) *Science*, **88**, 576.
Venning, E. H. (1938) *J. biol. Chem.* **126**, 595.
— and Browne, J. S. L. (1937) *Endocrinol.* **21**, 711.
— Henry, J. S. and Browne (1937) *Canad. med. Ass. J.* **36**, 83.
— Weil, P. G. and Browne (1939) *J. biol. Chem.* **128**, Sci. Proc. **32**, 107.

INFLUENZA VIRUS AND THE INCIDENCE OF PRIMARY LUNG TUMOURS IN MICE

BY J. ARGYLL CAMPBELL, M.D., D.Sc. Edin.

(*From the National Institute for Medical Research, London*)

INFLUENZA has been mentioned as a possible cause of lung cancer in man (see Campbell 1937b). In a statistical examination of the Yale autopsy protocols 1917–37 Rosahn (1940) found that there has been a real and absolute increase in lung carcinoma and recalls that in 1920, after an extensive experience with the pathological aspects of influenza, Winternitz and his colleagues prophesied such an increase because of the metaplasia of the bronchial epithelium and proliferation of young cells produced in the lungs. A possible criticism here is that the changes would have to persist for the production of cancer, and there is evidence from ferrets infected with human virus that the proliferation of the bronchial cells and the other changes become less marked and disappear as the animals recover (Perrin and Oliphant 1940).

Three years ago some experiments were begun to determine the combined effects of influenza virus and exposure to an atmosphere containing dust from tarred roads on the incidence of lung tumours in mice. It had already been demonstrated (Campbell 1934, 1937a) that such dust—both with and without the tar—increases the incidence of these tumours, and it was thought that the infection with the influenza virus might hasten or extend the carcinogenic action of the dust.

My colleague Dr. C. H. Andrewes vaccinated some mice, aged about two months, by peritoneal injection of virus vaccine, which produced no symptoms; this was followed by intranasal instillation of live virus. The survivors, about three months old, were then exposed for about ten minutes once an hour to a cloud of dust; in all six times a day on five days every week over a total period of a year. This technique has been described elsewhere (Campbell 1934, 1940). The sample of tar dust did not contain a very active carcinogenic agent since it did not produce cancer of the skin in the dusted mice. Some other samples of such dust have produced cancer of the skin when merely dusted on the mice (Campbell 1934). However, since an increase in incidence of lung tumours although less definite has been obtained with road dust from which the tar has been completely extracted by benzene (Campbell 1937a) the sample used in the present experiment should have produced a similar increase. It is possible that road dust may contain carcinogenic agents which are not soluble in benzene.

In all, 23 of the mice infected with influenza were dusted but only 13 of these lived to the age of ten months or longer. Only 2 of the 23 mice possessed tumours of the lung and in both cases the tumours were malignant. The ages of the 2 mice were 605 and 877 days, so that both had been exposed to the dust for the full period of a year. Since tumours of the lung are very rare in mice younger than ten months attention has been directed mainly to those older than this. In the present case only 2 or 15·4% of the mice older than ten months developed lung tumours. This is not a high incidence since the average figure for 593 control (not specially dusted) mice of similar age is 11·3%, and for 727 dusted mice 31·5%. From these figures it appears that the influenza virus has an inhibitory effect on the development of primary lung tumours in mice. At the same time it is realised that the number of influenza mice is rather few.

It has been noted before (Campbell 1940) that mice exposed to a dusty atmosphere and living ten months or longer reveal at death an increase in the incidence of hyperplasia of the lymph tissue both in the lungs and in the tracheobronchial nodes. In the present case the figures were 32 and 54% respectively, compared with about 8 and 12% for large numbers of control mice. The incidence of bronchopneumonia in the present case was 15%, compared with 10% for controls. As regards the hyperplasia of the cells of the bronchial mucous membrane as seen in influenza, only one mouse showed such a condition and this mouse was the first to die and had been dusted on two days only before death, at a time when the effects of the influenza virus could scarcely have disappeared.

SUMMARY

Influenza virus had, if anything, an inhibitory effect on the development of primary lung tumours in mice.

REFERENCES

Campbell, J. A. (1934) *Brit. J. exp. Path.* **15**, 287.
— (1937a) *Ibid*, **18**, 215.
— (1937b) *J. indust. Hyg.* **19**, 449.
— (1940) *Brit. med. J.* Aug. 31, 1940, p. 275.
Perrin, T. L. and Oliphant, J. W. (1940) *Publ. Hlth Rep., Wash.* **55**, 1077.
Rosahn, P. D. (1940) *Arch. Path.* **29**, 649.
Winternitz, M. C., Wason, I. M. and McNamara, F. P. (1920) Pathology of Influenza, New Haven, Conn.

A BULLET IN THE HEART FOR TWENTY-THREE YEARS

BY G. GREY TURNER, M.S. Durh., F.R.C.S.

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A GENERAL interest in the fate of foreign bodies encourages me to report the case of a man who is alive and well and has gone about his daily work for the last 23 years with a bullet lodged in the wall of the left ventricle.

The patient, aged 32, was admitted to a base hospital under my care in April, 1917. Eighteen days before admission he was struck on the front of the left side of the chest by a bullet from a machine gun at an estimated range of 500 yards. There was also a through-and-through wound of the left arm just above the elbow; this may have been inflicted by the same bullet which penetrated the chest. In its course the missile traversed a service waterproof, the left breast pocket of his tunic with its contents and his shirt (fig. 1).

When I first saw the patient, his only complaint was of some slight soreness about the wound on the chest. He was a well-developed man with rather a big chest and looked fit and well. There was a small wound of entrance ½ in. below and ½ in. external to the left nipple, but there was no wound of exit. There were the scars of the through-and-through wound about 2 in. above the left elbow, but this had apparently done no damage, and no disability ever arose from it. The situation of the wound on the chest wall at once suggested the possibility of some cardiac injury, but there were no characteristic signs. The pulse was regular and its average rate 64, and the temperature was normal. There was no dyspnœa.

Radiography showed that a service bullet, with its base anchored probably near the tip of the left ventricle,

was pulsing with the heart beat, while its point was whirled about in the blood vortex in the heart cavity. An electrocardiogram was submitted to the late Sir James Mackenzie, who reported:—

"The electrocardiogram shows nothing peculiar, excepting in the second lead where the wave T is inverted. This inversion of T was assumed at one time to be of serious significance, but I have watched cases who show it for a great many years, and this view has turned out to be unjustified."

FIG. 1—Notebook and letters traversed by bullet before entering heart.

The patient was apparently quite well and was finding enforced rest irksome. On May 12 he was allowed to get up and to walk about the ward and up and down stairs.

OPERATION

It seemed that the patient ran a great risk with a foreign body in so precarious a position, and I feared that at some time it would become dislodged and cause fatal embolism, or that blood would clot about it and produce a thrombus which might also cause embolism. Consequently I decided to attempt to remove the bullet.

The operation was performed on May 20, thirty-nine days after the receipt of the wound. The anæsthetic used was A.C.E. followed by open ether. The approach was made by the left parasternal route, and the general technique was as described by Theodore Kocher, in the third English edition of his textbook of operative surgery.

The skin incisions were along the line of the left sixth costal cartilage and vertically over the sternum to the level of the second. As a first step the 6th costal cartilage was excised and the pericardium easily exposed by dividing the attachment of the triangularis sterni muscle along the seventh costal cartilage and the sternum and pushing it outwards and upwards. Immediately air began to be sucked into the cellular tissue around the pericardium to such an extent that this area rapidly became emphysematous. It closely simulated air in the pleura and was rather an anxiety throughout the operation, though it was controlled to some extent by covering up the exposed part with large wet gauze swabs. The fifth and fourth costal cartilages were next cleared, the pleura being separated from their deep surfaces and gently pushed outwards by the finger before they were divided.

The flap of chest wall was then bent outwards; but, since this did not give enough working space, the third cartilage also was cut through and displaced. The pericardium, which was not distended, was readily opened by an oblique incision about 2 in. long made in the direction of the sixth cartilage. A little bloodstained fluid escaped, but there were no clots and no adhesions. When the heart was first exposed it beat in a tremulous fashion, but soon quieted down, and throughout the subsequent manipulation its movements were steady.

The spot where the bullet had entered, about the middle of the outer border of the left ventricle slightly towards its posterior aspect, was marked by a depression surrounded by a roughened whitish area on the visceral pericardium. The heart muscle round the wound felt firm but it was impossible to locate the bullet by palpation, because diastole allowed only 1 sec. of relaxation, the cardiac muscle becoming stony hard during systole.

The region of the scar and the area near the ventricular base were explored by puncture with a straight needle, without finding the bullet. The heart muscle was surprisingly tough, and the punctures only bled momentarily. The left auricle was then explored by external palpation, but nothing abnormal was detected.

It was still felt that the bullet might be lodged about the suspected area near the base of the ventricle. To steady the heart for final exploration a stitch of fine catgut was passed into the wall of the ventricle just by the side of the entrance scar. To gain a little more working space the sternal stumps of the divided costal cartilages were removed. Gentle traction on the stitch steadied this portion of the heart wall without in the least affecting its general action. Further punctures were made with the needle, but no bullet was found.

Since I was reluctant to give up the attempt, I exposed the posterior surface of the heart high up behind the ventricle by rotating the heart and then taking it into my hand for thorough palpation. By this method something hard and elongated could be felt in the centre of the heart, presumably near the base of the interventricular septum. But this examination gave us a fright, because the heart stopped beating as soon as mild pressure was applied to the base.

Consequently the heart was replaced in its normal position and the pericardium was sutured, a small drainage-tube being left in the lowest part of the sac and another laid along the outside near the suture line. The flap of chest wall was replaced and held in position with catgut sutures between the periosteum of the sternum and the perichondral structures. The skin was sutured with interrupted silkworm without tension, the drains being brought through the centre of the lower oblique incision.

The operation took an hour and three-quarters, the greater part of that time being spent in efforts to locate the bullet. The patient stood the ordeal well, and immediate recovery was satisfactory. The only troublesome symptom was persistent vomiting without nausea, and this was really distressing. For days the patient could keep nothing down, but in spite of this he seemed well and was quiet and undisturbed. In the course of a week the condition gradually subsided, having been entirely uninfluenced by treatment. The patient was well enough to be out of bed in three weeks. Five weeks after the operation, when he began to walk, the wound was firmly consolidated and the chest expanding well. Radiography a month after the operation showed the bullet in precisely the same position as before and moving with the heart beat, but the whirling movement had ceased.

FIG. 2—Radiogram showing bullet in left ventricle twenty years after the casualty.

SUBSEQUENT HISTORY

The patient left hospital nine weeks after the operation and thereafter steadily improved. In November he reported himself as very well, and next year he was transferred to the records office of his regiment. After taking his discharge early in 1922 he had a long rest before resuming civilian occupation in an office. Thereafter he was able to do all ordinary things in moderation, including a mild game of golf. Ten years after the operation he married. At times he was perhaps rather apprehensive and a little too careful. In consequence he put on weight unduly and suffered from indigestion.

In June, 1937—i.e., just over twenty years after the wound—he came to see me. He was very well and had no cardiac disability. His employment was indoors, but he lived in the country and usually drove his car to his office seven miles from home. When the weather was fine, but not in cold weather, he walked one and a half miles to the nearest village and travelled by 'bus. During recent years he had been making a garden and worked a good deal. He had given up golf a few years ago

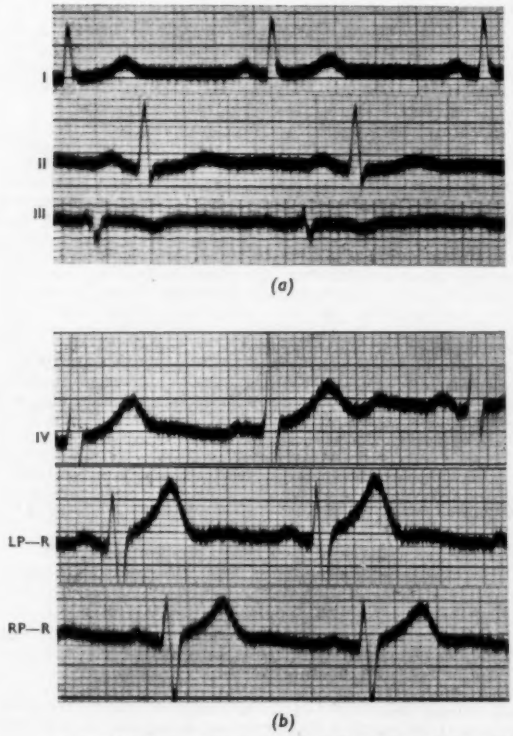

FIG. 3—Electrocardiograms taken twenty years after bullet entered heart: (*a*) limb leads; (*b*) chest leads.

because he thought it would perhaps be wiser not to exert himself unduly. Five years ago his appendix was removed under local anæsthesia. Recovery was uneventful, and he was back at the office in five weeks.

Dr. Duncan White radiographed him and reported: "A bullet is embedded in the wall of the left ventricular septum (fig. 2). Its movement is synchronous with the cardiac contractions. There is slight enlargement and rounding of the left ventricle, with very slight unfolding of the aorta."

Dr. R. S. Aitken, now Professor Aitken of Aberdeen, examined the patient's chest and found, except for some emphysema, no sign of disease. The heart appeared to be normal, the pulse was steady, and its rate was about 62. The blood-pressure was 138/88. At the same time Dr. Paul Wood made an electrocardiogram (fig. 3), which he reported as being entirely within normal limits.

In April, 1940, the patient reported that he was quite well, though he confessed to being a little tired, "a result of the present war, not the last one!" When fatigued he suffers from what he describes as indigestion, but this passes off after a week or ten days' rest.

CONCLUSION

The management of cases of foreign body in the heart which are not immediately fatal must be settled on general surgical principles. Nature should be assisted to exhibit her powers as a healer, and the patient with cardiac disability after gunshot wound should have many months of rest. If, in spite of a fair chance, the disability persists or develops after a period and interferes with usefulness, the aid of surgery may properly be invoked; but the difficulties may be very great, and even during operation a wise restraint may save a disaster. As the late Mr. Frank Jeans, of Liverpool, was fond of saying, "A living problem is better than a dead certainty."

BRONZED DIABETES IN A WOMAN

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HÆMOCHROMATOSIS or bronzed diabetes is an uncommon disease in men but is extremely rare in women. It is not always easy to determine whether a case showing cirrhosis of the liver, diabetes and some skin pigmentation is really a true case of hæmochromatosis, but I have seen and treated 28 certain cases in men in 16 years, whereas this is the first woman. This sex proportion is well known and Sheldon[1] in sifting the literature records 295 males but only 16 females, a ratio of about 18 to 1.

A thin woman of 73 was referred to our diabetic clinic with diabetic symptoms and a heavy glycosuria. She had noticed a dry mouth for some 2 years, but intense thirst and polyuria and pruritus vulvæ had been present for only 1 month. The urine contained 4% sugar, traces of ketone bodies, but no other abnormality, and the blood-sugar concentration was 358 mg. per 100 c.cm., proving that she had true diabetes mellitus. She gained a little weight at first on insulin, but then slowly lost 8 lb. and was admitted to hospital for full investigation which established the following characteristics of hæmochromatosis.

Skin.—The patient is a brunette but had noticed that her colour had been getting darker for many years. The whole skin is now a dirty light brown colour, but the exposed area—the hands and especially the face—shows a darker slaty brown colour typical of the disease. The mucous membranes are not pigmented and there are no especially dark areas round the pudendals which are so frequent. As usual axillary hair is absent and pubic hair scanty and fine. There are many senile warts on the abdomen and chest but these are not especially pigmented. The whole skin is dry, inelastic and loose because she has lost much weight. The conjunctivæ are muddy and dark in colour, but no unusual pigment is seen in the retinal fields.

The *liver* reaches three finger-breadths below the costal margin, is very firm, fairly smooth and slightly tender. There is no ascites, no suspicion of jaundice; van den Bergh, no chole-bilirubin, hæmo-bilirubin 0·6 unit. The spleen is not palpable. The fæces are normal and occult blood absent.

The *diabetes* is moderately severe but is well controlled by 44 units of insulin a day with a diet of 160 g. carbohydrate. Other points are the presence of peripheral neuritis, with absent knee- and ankle-jerks, and a few punctate hæmorrhages in the retina, the first I have seen in hæmochromatosis. The cardiovascular system is normal though extrasystoles are frequent; arteriosclerosis commensurate with age; blood-pressure 130/80 as an outpatient, 110/65 in bed.

The *blood-count* shows considerable microcytic anæmia. Red cells 3,600,000 per c.mm.; Hb. 75%; C.I. 1·04; white cells 12,000 per c.mm. (polymorphs 58·5%, lymphocytes 34·5%, eosinophils 1·5%, mononuclears 5·5%). Red cells show anisopoikilocytosis with occasional polychromasia and punctate basophilia. Basal sedimentation-rate = 18 mm. 1st hour (Fahrens).

The *sex history* is normal. She bore 2 healthy children in her fourth decade, menstruation started at 18 and was regular until the menopause at 50. This tends to show that she developed the disease unusually late in life since it interferes with sex function when it develops early. There is no family history of diabetes or other metabolic disease.

A *skin biopsy* was carried out on the left forearm, because although the clinical syndrome was clear I required the fullest proof that I had at last seen a female case of hæmochromatosis. The usual staining methods and chemical tests successfully demonstrated an increased deposition of melanin in the basal layer of the epidermis, and, more important, an iron-bearing pigment in the basal layers of the sweat glands, ducts and sebaceous glands. This deposit was nowhere heavy and always patchy, but proved the condition beyond doubt.

There is no established explanation of the sex distribution in hæmochromatosis, so preponderantly male. From a familial study I suggested[2] that it might be a sex-linked hereditary disease, transmitted like hæmophilia, but there has been no further proof or disproof of this. This is the oldest female case of hæmochromatosis so far recorded.

1. Sheldon, J. H. Hæmochromatosis, London, 1934.
2. Lawrence, R. D. *Lancet*, 1935, **2**, 1055.

Reviews of Books

Fighting for Life

By S. JOSEPHINE BAKER, M.D. London: Robert Hale. Pp. 287. 10*s*. 6*d*.

Dr. Baker started on a medical career because she was obliged to earn her living somehow, but she lived to learn that "this profession demands not only stubbornness but a devotion so whole-hearted that it amounts to absolute consecration." She tells simply and clearly the story of her pioneer work in the realm of public health and child welfare in New York. As a medical inspector in the Department of Health she was oppressed by the toll of infant life, especially from summer diarrhœa, among tenement dwellers, and came to the conclusion that the proper way to keep people from dying was to keep them from falling ill. Choosing one of the worst districts of New York, she sent a well-trained nurse to every mother within a few hours of the birth of her child, to give simple instruction in the art of keeping a normal baby well. The result was a large reduction of summer deaths among infants in that district—a demonstration of the fact that heat did not necessarily kill babies. In that same year, 1908, a division of child hygiene was created, with Dr. Baker as its chief, and the first bureau of child hygiene in the world was well on its way. Now, after thirty years, the infant mortality-rate in New York has gone down from 144 to 50 per 1000 live births. Neonatal deaths and maternal mortality are still too high, but Dr. Baker, always a believer in prevention, thinks that much could be done by better prenatal care. She deprecates the ultra-specialisation of medical practice, and the virtual disappearance in America of the general practitioner, and she thinks that state medicine will prove the solution of the problem. She is credited with having saved the lives of 90,000 babies, but on the whole, she says, her work was strangely impersonal. She found great waste going on, and set out to prevent it.

A Method of Anatomy

(2nd ed.) By J. C. BOILEAU GRANT, M.B., F.R.C.S. London: Baillière, Tindall and Cox. Pp. 794. 33*s*.

IT is generally recognised that the teaching of anatomy in this country is showing signs of reorientation, and even anatomists themselves are becoming aware of the necessity for such a change if their subject is to continue to hold its high position in the medical curriculum. Briefly, this reorientation aims at training students to understand and apply the fundamental principles of growth and development, of structural differentiation, and of the anatomical basis of functional organisation, rather than demanding of him a drudging and unintelligent memorisation of factual details many of which will be shed after the examination. It remains true, however, that every student who aspires to medicine must acquaint himself with the general topography of the human body, even if he is no longer required to pay attention to minutiæ. There are various ways of teaching topographical anatomy. One method is to give the student a cadaver, a scalpel, a pair of forceps and a manual of practical anatomy, and tell him to get on with it, while at the same time he attends systematic lectures in which the descriptive anatomy of systematic textbooks is drearily regaled to him in colourless (and often meaningless) lists of relations, muscle attachments, surfaces of bones and so forth. This method makes little demand upon the teacher's intellectual capacity. A better method is well illustrated in Professor Grant's book, for which a new edition has been called. Here we find a successful attempt at teaching the data of gross anatomy by correlating them with each other and with functional processes, and by showing the student how they can be fitted together to give a real understanding of the organised and working machinery of the living body. By making every use of the emphasis offered by comparison and contrast, and by writing in a personal style, the author presents the gross anatomy of the human body as a lively study, and his book is illustrated by clear and striking diagrams. As a text-book of purely descriptive and regional anatomy the book is undoubtedly a success, and we can recommend its use to students, particularly to those whose visual memory is but poorly developed.

Therapeutics of Internal Diseases

Edited by GEORGE BLUMER, M.D., David P. Smith clinical professor of medicine, Yale University school of medicine. London: D. Appleton-Century Company. Vol. I, pp. 872; Vol. II, pp. 1042. Complete in four vols. £9 the set.

A BIGGER and better book than ever before has been Dr. Blumer's aim. There are twelve contributors to volume I, which deals at length with the principles of treatment and some technical methods. Nutrition, climatology, spa therapy, physical therapy, occupational therapy, use of gases, endocrine therapy, and serum and vaccine therapy are some of the chapter headings; intravenous therapy, blood-transfusion, spinal puncture and several other procedures are described and discussed. In volume II (19 contributors) there is a long section on the pharmacology of the important drugs, including local and general anæsthetics, then chapters on the treatment of all the diseases due to infection, each with its little diagnostic summary. Volumes III and IV will complete the textbook diseases. When such a wide field is to be covered—wider even than the title indicates—patchiness is almost inevitable, and there is considerable variation in the standard of different sections. There is also some repetition, but these faults do not hinder the work from being an impressive presentation of modern American thought and practice in therapeutics, well illustrated, documented and produced.

The Newer Nutrition in Pediatric Practice

By I. NEWTON KUGELMASS, M.D., Sc.D., attending pediatrician, Broad Street Hospital and Heckscher Institute, New York. London: J. B. Lippincott. Pp. 1155. 55*s*.

THE first section of this book is an outline of the principles of nutrition; the second deals with the development and feeding of healthy children; in the third almost all the diseases which affect children are considered from the nutritional aspect, most attention naturally being paid to digestive, metabolic and deficiency diseases. In such an ambitious work there is much to criticise, but Dr. Kugelmass has succeeded in writing a useful dogmatic book expressing his own opinions. As in most American books there are good bibliographic lists, mostly referring to American work but with a proportion of European names. Charts are used effectively, but the pictorial illustrations are only fairly good; thus there are eleven pictures of rickets but the typical radiological changes of the active stage are not shown. It is odd to find 56 pages taken up with tables of ketogenic diets, while only 13 are allowed for tables of normal diets and 14 pages cover the whole subject of constipation. The English is not beautiful but is often pithy—for example, "The only way to humanise cow's milk is to pass it through the mother."

Clinical Roentgenology of the Alimentary Tract

By JACOB BUCKSTEIN, M.D., visiting roentgenologist to the Bellevue Hospital, New York. London and Philadelphia: W. B. Saunders Company. Pp. 652. 50*s*.

THIS is a well-balanced account of pathological lesions of the alimentary canal as revealed by X rays, along with illustrative case-histories of patients which give a personal touch and make the book very readable. Reference to the work of pioneers on each subject provides an adequate historical background. In the comprehensive bibliography at the end of the chapters work done in this country however receives scant notice. In the description of pyloric stenosis, for instance, the hypertrophic form seen in adults is barely mentioned, without reference to Twining's important work. Dr. Buckstein apparently has no use for the preliminary films which we find useful to show detail of soft tissues in the investigation of alimentary-tract lesions, nor for plain films (i.e., without contrast medium) in intestinal obstruction. There is no mention of the thorium double-contrast enema and the little about the ordinary barium double-contrast enema is not adequate. But in general the illustrations are well chosen and clearly show the diagnostic points; they are also exceedingly well produced.

The book will rank as a standard work on its subject.

THE LANCET

LONDON: SATURDAY, OCTOBER 19, 1940

SAFEGUARDING SLEEP

THE insomnia from which many people in bombed areas are suffering may be a symptom of a more general disturbance, but it can lead to an intensification of fatigue and anxiety—a vicious circle. Should the circle be broken by sedative drugs, as advocated by Dr. TAYLOR HARRIS in our correspondence columns last week? Sleeplessness among these people is the result of experience of the effects of immediate or remote bombing which has induced an emotional attitude towards certain stimuli, specially certain auditory stimuli. Noise alone does not keep people awake, once they have had a little time to recognise that it has no importance for them; the classical example is that of the mother who sleeps tranquilly next door to a goods yard but who wakes the moment the baby whimpers in the next room. She responds to the emotionally important noise but not to the impersonal loud noise. If a Londoner regards the guns as noises which do not concern him, he can sleep; if he has come to regard them as signals that his life is in danger, it is another story. It is the same with sirens warbling, German aeroplanes humming, shrapnel whistling; give them personal meaning for John Doe or Richard Roe, make them agents of dread, signals of descending death, and they will wake him from his sleep all right. Noises, however, are not the only things that keep people from sleeping soundly; discomfort, cold, hunger, unaccustomed company or unaccustomed loneliness, misery of every sort may do this, but the remedies for these are chiefly social. As far as noxious noises are concerned, the measures for safeguarding sleep are ear-plugs, deep and therefore sound-proof shelters, and sedative drugs. Ear-plugs are very well in their way, but there are many people who would prefer to hear the whistle or the whoosh of the bomb that was making for them; they believe, or feel, that they would then do something about it. Deep shelters are as yet luxuries for the few. There remain drugs.

As sedatives the bromides stood almost alone for seventy-five years, and large doses can be safely given for short periods. But unfortunately their cumulative effects are too serious to justify their prolonged use. For the past 25 years their pre-eminence has been challenged by the barbiturates, which were made available as long ago as 1898 by the work of NEBELTHAU. PURVES-STEWART and WILLCOX have warned us of the toxic effects of these drugs, but when they are used in the comparatively small doses needed to allay anxiety alarming effects are rarely encountered. The manifestations of idiosyncrasy, especially morbilliform rashes, are seen from time to time, but they are exceptional. Most physicians have had under their care epileptics who have taken four or five grains of phenobarbitone daily for a year or more without showing signs of poisoning. It is true that these people seem to be more tolerant to the drug than non-epileptics, but the observation suggests that the liver can cope with substantial amounts of barbituric-acid derivatives. Our timid use of these valuable hypnotics is largely attributable to that bogy of therapeutics, drug-addiction. Addiction is, in fact, a rare event when considered in relation to the enormous consumption of barbiturates all over the world.

The barbiturates of choice for the present purpose are those in which the side-chain is oxidised slowly so that a mild but sustained effect is produced. Phenobarbitone in doses of gr. ½ twice or thrice daily is particularly useful, but gr. 2 of sodium barbitone (Medinal) three times a day may be equally satisfactory. Apart from their portability—an important point when they are taken at work—a further advantage of barbiturates over bromides is their greater selective action on the centres controlling emotional tone; if the dose is carefully adjusted, general depression of the higher centres and association fibres is slight or absent, and the mental slowness and lethargy, the hangover common after therapeutic doses of bromides, are not seen. Experience in the treatment of peace-time anxiety associated with the struggle for existence and happiness gives grounds for the belief that the intelligent use of the barbiturates in war-time will help the many millions now facing the challenge from the air. They will take the edge off anxiety, give the highly strung tranquillity and self-confidence, and will send the weary to bed more hopeful that sleep will not be awaited in vain.

BIRTH OF A TRADITION

ONE day in March, 1838, Mrs. James Crichton of Friars' Carse stepped into her C-spring coach, painted yellow and black, and posted to Montrose. She was going to see Dr. W. A. F. Browne, and if she liked the look of him she meant to make him superintendent of the new Crichton Royal Institution, now almost complete. Her husband, Dr. James Crichton, had left a large fortune to be applied to such charitable purposes as she and her co-trustees thought fit, and after due consideration his bequest had been used to found at Dumfries a hospital for the humane treatment of the insane. Stories of past ill-usage of the mentally sick evoke in us the same disgust as accounts of an earlier barbarous penal code; to Mrs. Crichton they were commonplaces which many of her contemporaries contrived to ignore. She was one of those, like Elizabeth Fry, who could not rest comfortably in the knowledge of abuses; in the new Crichton Royal Institution the insane were to be regarded and used as sick people and the superintendent of her choosing must be a man who believed in that principle. Dr. Browne, resident physician at Montrose Royal Asylum, was young, but he had travelled and studied under Pinel and Esquirol and had written a book called "What asylums were, are and ought to be." She liked him on sight, gave him the appointment, and posted back to Friars' Carse in her yellow C-spring coach.

That was the beginning of a hundred years of sympathetic work for the insane, now commemorated in "The Chronicle of Crichton Royal" (Courier Press, High Street, Dumfries), by Dr. C. C. Easterbrook, superintendent of the hospital from 1908 to 1937. In a foreword, the late Sir James Crichton-Browne, whose astonishing longevity almost bridged the gap of a century, put down some memories of the hospital in the days of his father, the first superintendent. He recalls Mrs. Crichton "as a prim little lady in a black

gown with a frilled collar and frilled widow's cap, of a somewhat sombre manner, as was the fashion of the time," but genial, kindly, well-informed and with a sweet voice. Her portrait, reproduced in the book, frilled collar and all, shows her with a pleasing douceness and an inquiring eye. Dr. Browne is there, too, and it is not difficult to see in his plain and kindly countenance the quality that assured Mrs. Crichton that his patients would be gently treated. Dr. Easterbrook has told the story of the hospital not as a connected narrative but as a collection of summaries under the headings of successive years. This has the advantage of making it easy to follow growth and change in the hospital departments: and change at Crichton Royal has always been growth in the best sense. The steady improvement in accommodation illustrates this very well; the hospital, as originally designed by Mr. William Burn, was to have been a three-story building carrying the stamp of a lingering Regency tradition; it was modified, however, and the building when completed though pleasing and spacious had lost much of the elegance and proportion of the original design. As the years go by we see this early building changing, dissolving, spreading, like a plant in one of those nature films which show you a life history in a few minutes. Here a piece of land is added, there a new building is opened to receive "pauper lunatics"; in 1852 new kitchens and bakeries are being built, in 1860 the heavy window guards and shutters are being removed, in 1867 the institution buys its own farm, in 1882 an ornamental tiled floor and Venetian blinds have found their way in. And so it goes on. Nowadays Crichton Royal with its many buildings and acres is what it always was—a mental hospital in the forefront of its kind, leading, not following in the rapid advance of work for the mentally sick.

SURGERY OF DYSMENORRHŒA

DYSMENORRHŒA is an economic problem, wasting many valuable hours of working time in young women. How great this wastage may be is pointed out by MILLER,[1] who calculates that 45% of all menstruating women suffer some discomfort at the menstrual periods, while 17% are seriously incapacitated for at least an hour every month and many for a longer period, sometimes for a whole day. In Canada the working time lost by women as a result of menstrual troubles amounts to 9000 days in the year. A number of useful women are deterred from going to work because of their liability to this recurrent incapacity. The textbooks of gynæcology offer a dispiriting prospect for a woman suffering from intractable dysmenorrhœa. She starts with analgesic drugs, working up from aspirin to the barbiturates, with perhaps a dash of belladonna thrown in, on the assumption that the pain is a visceral spasmodic cramp. She graduates to a dilatation, which offers generously to relieve in 50% of cases and to cure in 25%. If unsuccessful this may be repeated or she may be straightway promoted to a presacral neurectomy if her doctor is surgically minded; if he is organotherapeutically minded she undergoes a long and expensive course of œstrin or progesterone therapy. Meanwhile she has been advised by the distaff members of her family to get married and have a child, but this is no certain cure. As a last resort she is seen by a psychiatrist or by a surgeon who performs a subtotal hysterectomy. It is not surprising that many of these women are ultimately branded as neurotics.

The true nature of the complaint is concealed under a multiplicity of largely meaningless terms, which serve as a cloak for our real ignorance of the cause; thus we have primary, true idiopathic, spasmodic, virginal and even intrinsic dysmenorrhœa; these are separated from secondary dysmenorrhœa. This last is a more reasonable term and includes all those cases in which the pain first occurs in association with some definite organic lesion of the uterus or appendages, such as myoma, endometrioma and inflammatory diseases of the adnexa. The group of organic dysmenorrhœas is a separate entity and must be excluded from consideration here since cure follows the ablation or correction of the cause. This leaves a large group of so-called functional dysmenorrhœas in which a careful pelvic survey excludes uterine or adnexal abnormality. O'DONEL BROWNE[2] makes a strong plea for the subdivision of this class into uterine and ovarian dysmenorrhœa. He bases his arguments first on clinical grounds and secondly on a technique of exclusion by examination which he has devised himself; and he then correlates his conclusions with the physiology of the nerve-supply to the female genitalia. Clinically the uterus refers pain to the midline of the abdomen and always below the umbilicus. The character of this pain is a sharp stabbing or cramp—hence the term spasmodic dysmenorrhœa. It may also be a dull ache, but subject to exacerbations. Though often premenstrual, it may coincide with the flow, to cease an hour or two after its establishment; rarely it persists to the end of the menstrual loss. Ovarian pain, in contrast to this, may be unilateral or bilateral or even referred to a side opposite to the lesion; it is menstrual but chiefly premenstrual, always subumbilical, but for some queer reason chiefly on the left side and often radiating down the thighs. Nausea, dyspareunia, dyschezia and even fainting attacks are inconstant symptoms. Diffuse lower abdominal pain, central and lateral, suggests a mixed uterine and ovarian origin. O'DONEL BROWNE separates these two distinct types of pain by compressing each ovary in turn between the examining fingers. If this manœuvre faithfully reproduces by a deep-sensibility reflex the type of pain that the patient knows as dysmenorrhœa, then the ovary is the origin. He then passes—without anæsthesia, but with full aseptic ritual—a uterine sound, and gently stimulates the endometrium of the uterus in all directions with its blunt point. The nature of the pain evoked is carefully noted and if it mimics the pain of the patient's dysmenorrhœa the uterus is concluded to be the origin. It is important not to grasp the cervix with a vulsellum but to conduct the whole procedure with great gentleness. The sound can be passed blind if a small Cusco's speculum is impracticable. Any gynæcologist of experience will agree that this examination is quite feasible. The origin of the pain can thus be attributed to uterus alone, ovaries alone, or both. Surgical correction can be achieved by interrupting

1. Miller, N. F. *Canad. med. Ass. J.* 1940, **42**, 349.

2. Browne, O'D. T. D. *J. Obstet. Gynæc.* 1939, **46**, 962.

the nerve path, which is now recognised to be separate for ovary and uterus. The ovarian innervation is bilateral and chiefly sympathetic, being derived from the renal, intermesenteric and cœliac plexuses. The ovarian nerves are two or three in number and their terminal ramifications end outside the theca externa of the follicle; they pass no further, the membrana granulosa being nerveless. These sympathetic fibres are vasoconstrictor; a few parasympathetic fibres provide a poorer and weaker vasodilator supply. The vasomotor effects of surgical denervation of the ovary are fortunately few, if any, because the hormonal control attends to the proper function of the ovarian cycle. Fertility and pregnancy are not adversely influenced; only two of O'DONEL BROWNE'S cases married after ovarian denervation, but each has subsequently been successfully confined.

In all cases of primary dysmenorrhœa in which he opened the abdomen, O'DONEL BROWNE found sclerocystic disease of the ovary, and he suggests that this is accompanied by perifascicular and intrafascicular nerve degeneration similar to that found in the presacral nerve in connexion with uterine dysmenorrhœa. This pathological change has been investigated and discussed by DAVIS.[3] As a control, O'DONEL BROWNE examined the ovarian nerves of women undergoing hysterectomy who were known not to suffer from dysmenorrhœa, and in no case did he find a comparable nerve degeneration—a point which must be confirmed if possible by other workers. He explains the cyclic nature of the pain as being due to the pressure on the diseased nerve-endings caused by premenstrual œdema. If the pain is more constant it is thought to be due to fibrosis in the region of the nerve-endings. He discusses the time-honoured cervical stenosis, so specious a cause of dysmenorrhœa in our fathers' and forefathers' time. Of all the cases he has examined for dysmenorrhœa only 1–2% had a genuine narrowing of the cervical canal. If a woman suffers from such severe menstrual pain as to warrant surgery after the failure of reasonable medical treatment, and if it is decided that she has ovarian dysmenorrhœa, the nerve path for her pain impulses must be destroyed. L'HERMITTE and DUPONT[4] realised that this denervation must be bilateral, and they now advocate a division of the main ovarian nerve bundles in the mesovarium without interfering with the blood-supply. O'DONEL BROWNE divides both infundibulo-pelvic ligaments, vessels and all, at the brim of the pelvis and securely ligates them with silk. The stumps at each side are sutured together distal to the silk ligature to prevent ovarian prolapse. The ovary is in no vascular jeopardy after this division; the medial stump if unligated shows free arterial bleeding from the uterine anastomosis. A presacral neurectomy, appendicectomy or Gilliam's operation is performed according to the merits of the case. Of 16 cases so treated by O'DONEL BROWNE 10 are complete cures, while 6 are classed as failures. Of these 6 no less than 4 were unsuitable, 1 having endometrioma, 2 salpingitis and 1 tuberculosis. The corrected cure-rate is 5 in 6, a refreshing figure for any treatment of dysmenorrhœa. O'DONEL BROWNE'S denervation should be tested and reported on, so that we may know whether we have, if not the solution, at least a line of sound surgical attack on this problem.

3. Davis, A. A. *J. Obstet. Gynæc.* 1933, **40**, 480.
4. L'Hermitte J. and Dupont, R. *Gynéc et Obstét.* 1927, **15**, 161.

Annotations

BIRTHDAY IN THE CRAFT

MEDICAL journalism is an old trade, going back perhaps to the famous code of Hammurabi, King of Babylon, who believed in punishing malpraxis by death and said as much in print. Medical journals, however, have not on the whole been notable for longevity. In the last century many mushroom ventures died, generally because they failed to fulfil promises made in a spacious mood at the start. Recently we had an opportunity in the columns of the *British Medical Journal* to congratulate our crony of a hundred years on a long and honourable life; this week we take pleasure in continuing those congratulations at more length. Birthdays, which loom so large in childhood, sink into welcome obscurity in middle age and only become subject for fresh enthusiasm when they indicate a high survival value. In medical journalism, as we have suggested, survival depends on the honest fulfilment of obligations—a criterion which might be extended to the human race with advantage. When Sir Charles Hastings founded the Provincial Medical and Surgical Association, its transactions were published annually; but in 1840 the association founded a weekly, the *Provincial Medical and Surgical Journal*, which later changed its name to the *Association Medical Journal*, and finally, in 1857, to the *British Medical Journal*. Allowing, then, for these nursery names the journal has achieved its century. If we can accept the old saying that the first hundred years is the worst, the future of our friend and rival will be of formidable brilliance, and it is comforting to reflect that being well launched on our own second century we share the same happy augury. But there are institutions to whom this birthday-consciousness—even for birthdays a hundred years apart—no doubt seems juvenile and immature. The colleges of our older universities, for example, might smile at such salad enthusiasms. When THE LANCET and the B.M.J. of three hundred years hence salute each other they will do it more casually. But speaking, as we do, in pinafores we are happy to think of a hundred years of sound medical record and criticism completed and we offer our best wishes for the centuries to come.

WHAT IS LEUKÆMIA?

THE nature of human leukæmia is unknown and we still take cover in such meaningless clichés as the dim borderline of malignancy to hide our ignorance. There are three common theories—that it is caused by an unidentified infecting agent; that there is a metabolic upset from an excess, deficiency or abnormal formation of an internal secretion; or that the disease is a variety or perhaps varieties of malignant neoplasm. For each of these views there is circumstantial but little direct evidence. Among oblique methods of approach are the study of the chemical and cellular metabolism, the influence of heredity and various forms of trauma in animals and the behaviour of the pathological cells in tissue culture. Much work by reliable witnesses is on the side of the neoplastic theory but there are still many points to sort out. There is the widespread and so far as we know simultaneous involvement of many parts of the hæmopoietic system, the great differences in the clinical course of the disease, and the point made by Naegeli that infiltration of muscle by leukæmic cells destroys by compression and never by direct invasion. An explanation of these points is necessary, for until we can concentrate our efforts on a single and useful line of thought the chances of progress are poor. Tissue culture should

offer hope, since the behaviour of malignant cells under these conditions is becoming fairly familiar. But Forkner[1] says that tissue culture has done little for our knowledge of the pathological physiology of the disease and nothing to lessen the diagnostic difficulties. Nevertheless Israëls[2] has reopened its possibilities by cultivating the bone-marrow in vitro from patients with various forms of leukæmia and watching the development of the pathological cells. He believes that leukæmic cells in culture develop in a manner resembling the normal. After a fortnight's culture he found that a majority of primitive or embryonic cells was converted to a majority of more mature types, and that in marrow from myeloid leukæmia myelocytes, metamyelocytes and young polymorphonuclears were predominant with mitosis still going on among the myelocytes. Cultures from the bone-marrow of patients with monocytic leukæmia showed after a fortnight almost all the cells to be mature phagocytic monocytes. It has already been shown that lymphocytes treated in a similar way tend to remain more or less stationary. The implication of Israëls's work, however, is obvious, and as he says the leucocytes in human leukæmia do not show in vitro the rapid mitotic division nor the fixity of type noted in the cell of the transmissible leukæmias. He points out that the evidence that leukæmia is a malignant new growth rests largely on studies of the transmissible leukæmias of fowls and rodents, and these as Ewing emphasised are not identical with or even strictly analogous to the human varieties. The fact that human leukæmic cells may in favourable surroundings develop into terminal types which no longer divide by mitosis gives a reasonable explanation of the repeated failure to transmit human leukæmia either to other people or to animals. We are still far from an explanation of the nature of human leukæmia, but it is progress to signpost the primrose paths of speculation and false analogy.

RHEUMATOID ARTHRITIS AND VITAMIN D

A GROUP of workers at the University of Illinois college of medicine has become interested in the treatment of rheumatoid arthritis with large doses of vitamin D, as a sequel to a single chance observation. At the allergy clinic of the university cases were under treatment with such doses of vitamin D and among the allergic subjects happened to be two with rheumatoid arthritis. These both reported alleviation of their joint pains while under treatment, and from this occurrence has sprung a large body of research and a form of treatment which has met with considerable success. Reed, Struck and Steck, have now published a progress report in the form of a book,[3] the first part of which sets out established knowledge of vitamin D; subsequent chapters deal with the relation of vitamin D to the parathyroid glands, the toxic effects of vitamin D and the effects of vitamin D on mineral metabolism. The influence of vitamin D on energy metabolism is also considered; experimental data on this part of the subject are scanty but the field is an important one from the standpoint of this work, since treatment with thyroid extract is often useful in rheumatoid arthritis. Two conclusions are tentatively suggested: first, that pure vitamin D becomes toxic only when, through gastrointestinal disturbance or other causes, it becomes decomposed into toxisterol; and secondly that the effect of vitamin D on energy metabolism and thyroid function is mediated through the thyrotropic mechanism of the anterior pituitary.

1. Forkner, C. E. Leukemia and Allied Disorders, New York, 1938.
2. Israëls, M. C. G. *J. Path. Bact.* September, 1940, p. 235.
3. Vitamin D. By C. I. Reed, Ph.D., associate professor of physiology, H. C. Struck, M.S., associate in physiology, and I. E. Steck, M.S., M.D., instructor in physiology and in medicine, University of Illinois college of medicine. U.S.A.: University of Chicago Press; London: Cambridge University Press. Pp. 389. 27*s*.

The authors summarise the treatment of rheumatoid arthritis with vitamin D as follows. "A group of forty-five cases of atrophic arthritis, seven cases of hypertrophic arthritis, and three mixed cases were treated with 150,000–200,000 units of vitamin D daily with definite measurable improvement in 74·5% of cases, as manifested by reduced swelling and pain, increased mobility (active and passive), improved muscular tonus, and weight gain." It is notoriously difficult to assess improvement in rheumatoid arthritis; pain is not necessarily proportional to deformity, so that one of the main criteria of improvement is subjective. Spontaneous remissions are common and the disease is influenced by climate and season, but the success achieved with vitamin-D therapy does seem to lie outside the normal fluctuations of the disease. It is remarkable, however, that only these enormous doses were tried. It is true that they were scarcely ever found to be toxic and improvement accompanied their use, but no attempt seems to have been made to ascertain the effect of moderate physiological doses over long periods. The authors definitely reject the view that vitamin-D treatment is specific and say that "there is no implication that vitamin-D deficiency is an etiologic factor in the development of arthritis," but they give no clear reason for their attitude. Certainly vitamin D in large and smaller dosage deserves an extended trial in this country, where rheumatoid arthritis is the commonest cause of chronic subacute pain and partial crippling.

ADRENAL HYPERTROPHY IN INFANTS

Dijkhuizen and Behr[1] have described what they claim to be a new clinical entity of the neonatal period. Four young infants developed violent vomiting, passed thin green stools or were constipated, and were diagnosed as cases of intestinal stenosis. All died. In three, two boys and one girl, post-mortem examination showed great hypertrophy of the suprarenal glands, one baby had bronchopneumonia as well, none had intestinal stenosis. In the fourth case, a pseudohermaphrodite, brother of one of the other children, no autopsy was done. Dijkhuizen and Behr are unable to explain the symptoms, but they mention five similar cases, which are on record. In addition, post-mortem specimens from two cases have been shown by Ellis[2] and Evans[3] at the Royal Society of Medicine. On the face of it there seems to be a real connexion between enlarged suprarenal glands in the infant and the clinical events—vomiting, dehydration, collapse and death—and the Dutch paper should attract attention to the connexion, whose nature has yet to be explained. There are interesting clues: the frequent but inconstant male or female pseudohermaphroditism, inconstant perhaps because the glandular enlargement does not always start at the same period of intra-uterine life; the presence of peculiar giant cells in the internal cortical zone in one of the Dutch cases and in some sclerotic adrenals in Addison's disease; urinary abnormalities—"hæmorrhagic nephritis" without post-mortem changes in the kidney,[4] albuminuria and occasional cylindruria and hæmaturia with a raised blood-urea,[2] albuminuria and glycosuria with minor changes in the renal glomeruli and the convoluted tubules,[3] and the occurrence of albuminuria with nitrogen retention and of glycosuria in adult patients with phæochrome tumours.[5] Detailed biochemical studies are not easy in small infants who are gravely ill, but might be as fruitful in this uncommon disorder as they have been in Addison's disease.

1. Dijkhuizen, R. K. and Behr, E. *Acta pæd.* 1940, **27**, 279.
2. Ellis, R. W. B. *Proc. R. Soc. Med.* 1933–34, **27**, 401.
3. Evans, P. R. *Ibid*, 1937, **30**, 1190.
4. Hammer, *Ned. Tijdschr. Geneesk.* 1937, **81**, 3201, quoted by Dijkhuizen and Behr.
5. Goldzieher, M. A. The Adrenals, London, 1929, p. 220.

BONE-MARROW BIOPSY IN CHILDREN

So many hæmatological puzzles occur in children that it is not surprising that efforts have been made to adapt the sternal-puncture methods suitable for adults for use on children. The chief difficulty is that ossification of the sternum is only beginning at birth and the sternum remains segmented for some time. Diwany [1] has now described the precautions that must be taken when performing sternal puncture in children, and, with illustrations of the progress of ossification, defines the best sites. He emphasises rightly that great care must be taken and a guard arranged on the needle to limit penetration to a known degree. Lichtenstein and Nordenson [2] working on premature infants used puncture of the diaphysis of the tibia as an alternative site. Diwany only examined a small number of children and it is not surprising that there is much variation in his results. Larger series have been reported by Kato [3] and by Vogel and Bassen.[4] All agree that as age increases the proportion of erythroblasts decreases steadily, and none found true megaloblasts present even in infants. The reported variations in the percentages of the different cells make it clear that larger groups will have to be studied before the normal marrow picture at different ages is adequately defined; the range of normal limits will certainly be large. In the meantime these descriptions should stimulate the study of marrow changes in the blood diseases of children, and the method gives a reasonable hope of obtaining information that will help to bring about a better classification of the many puzzling blood-pictures found. Probably repeated punctures will be needed since the blood-forming tissues of children seem very labile; for this reason it will probably be found better to use a needle of smaller bore than the standard Salah needle.

TUBERCULOUS INFECTION IN CHILDHOOD

CHILDREN have shared in the striking decline in mortality from tuberculosis during the last fifty years. In a recent review [5] H. C. Cameron attributes this mainly to the diminished risk of contact with infective human adults and in lesser degree to control of the bovine disease and to more pasteurisation of milk. Not only has mortality declined but there is evidence of less frequent infection. It is no longer true that sooner or later every child reacts to tuberculin. The old figure of 80% Pirquet-positive among Viennese children has sunk to 40% in children over ten, and recent large-scale investigations have found only 10 to 15% positive reactors in the child population of some American cities. But that gives no ground for complacency. A better understanding of childhood infection would reduce the incidence still further. Cameron traces the natural history of the disease in the young. There is the stage of primary infection, insidious with often little tissue reaction; in the infant this is a danger period, for the infection may prove overwhelming. Bacillæmia resulting in miliary tuberculosis and meningeal involvement may follow in the fourth to sixteenth week after primary infection. Older children mostly pass the stage of primary infection unscathed, to face the second danger period of adolescence when it is still hotly debated whether the reinfection is exogenous or endogenous. If from without then it is of supreme importance for all positive reactors to be screened from contact with infectious adults. It is important also to distinguish between the household and the family in seeking for possible sources of infection. As Margaret Macpherson has pointed out,[6] a routine history of the health of father, mother, sisters and brothers may give the impression of a healthy family, but it gives no clue to the presence of a grandfather sitting all day at the fireside with so-called chronic bronchitis—which, in reality, is a senile type of tuberculosis giving rise to sputum rich in tubercle bacilli; nor will the family history include the lodger wth cough and sputum who has recently departed to enter a hospital and from there has gone on to a sanatorium. Cameron discusses the recognition of primary infection. Symptoms are minimal or absent. The physical signs found in adult forms of tuberculosis do not occur. Erythema nodosum may give a warning but the suspicion of primary infection is usually based on vague ill health leading to investigation along three lines: a tuberculin reaction, X-ray examination of the chest (in which transitory shadows may be found), and a determined search for tubercle bacilli in stomach wash-outs. If positive evidence of infection is obtained in any of these ways the child should be placed in conditions where the risk of further infection is minimal. The younger the child the more important is this segregation. Miriam Brailey has shown in a recent survey [7] at the Johns Hopkins Hospital that when contact infection has occurred the highest case-fatality is in infants under one year. Her studies show the complexity of the problem. In a series which included both white and coloured children in contact with adult infection the risk of dying from tuberculosis was three to four times greater for the coloured children than for the white. We are left wondering whether this is due to racial susceptibility or to differences in nutrition and hygiene.

CHEMOTHERAPY AND MENINGOCOCCAL CARRIERS

THE action of the sulphonamide drugs is most striking when susceptible organisms are actively multiplying in the blood or tissues. Even in culture media containing sulphapyridine, as Finland and his colleagues [8] have shown in the case of the pneumococcus, the organism must multiply before the drug can act. Does the meningococcal carrier state comply with this condition of successful chemotherapy? Meningococcal carriers are of various kinds. Many are temporary carriers for a few days or weeks owing to contact with another carrier or a patient suffering from the disease. Repeated reinfections in this way are not uncommon, and in times of epidemic prevalence individuals who are constantly exposed to infection may exhibit such an intermittent carrier state over long periods. It is important to differentiate between the carriers of parasitic or epidemic strains, mostly group I, and those of group II or anomalous strains which are mainly saprophytic. In epidemic times both contacts and non-contacts of cases in a community where the disease is occurring often harbour group-I strains. It seems probable that the organism maintains itself in most of such cases by a process of slow multiplication on the surface of the mucous membrane of the nasopharynx or in the pharyngeal tonsil. This may happen without clinical evidence of pharyngitis, and indeed it is still not known whether the pharyngitis which may precede the onset of meningitis is due to the meningococcus or to other organisms. Such carriers may well be susceptible to chemotherapy. There is, however, a more chronic type of carrier, often with abnormalities of the nasopharynx, who harbour, apparently continuously, the relatively avirulent group-II strains for months or years. These are always with us, at all seasons and irrespective of epidemic prevalence. In some of them the organism may be maintaining itself saprophytically in secretions with little multiplication

1. Diwany, M. *Arch. Dis. Childh.* September, 1940, p. 159.
2. Lichtenstein, A. and Nordenson, N. G. *Acta Pædiatr., Stockh.* 1939, **24**, 57.
3. Kato, K., *Amer. J. Dis. Child.* 1937, **54**, 209.
4. Vogel, P. and Bassen, F. A. *Ibid*, 1939, **57**, 245.
5. *Guy's Hosp. Gaz.* Aug. **24**, 1940, p. 242.
6. *J. R. Inst. Publ. Hlth*, August, 1940, p. 201.
7. *Milbank mem. Fd. quart. Bull.* 1940, **18**, 222.
8. Spring, W. C. Jr., Lowell, F. C. and Finland, F. *J. clin. Invest.* January, 1940, p. 163; Finland, Spring and Lowell, *Ibid*, p. 179.

and out of reach of the blood-stream. There would be little hope of clearing up these by chemotherapy, but fortunately they are the least important.

Controlled observations on the effect of chemotherapy on large numbers of carriers of various types, differentiating the organism, are now urgently required and are indeed the only way to settle the question. Meehan and Merrillees[9] have provided some data which appear to warrant further investigation on controlled lines. In a group of 60 children, part of the population of a foundling hospital, there were 30 cases in six outbreaks, spread over a period of 2½ years or 3 seasons. Attempts at isolation of cases and carriers failed to prevent the appearance of new cases. In the institution 75 carriers were discovered, mostly in the affected group. Sulphapyridine was then given to all the carriers, in doses of 1 gramme daily per 14 lb. of body-weight for five days, and this course was repeated after five days; there was an immediate drop in the number of carriers from 75 to 6, and ultimately to 3, after two repetitions of the courses. The most satisfying event, however, was that no further case of the disease had appeared up to the time of writing, a period of a year. It may, of course, be objected that the period of immunity from the disease is too short to be conclusive, that there was no typing of the organisms, and no controls. Nevertheless, prima facie, there appears to be a case for further trial of chemotherapy with carriers, especially in a closed community. To deal with carriers generally on these lines would introduce formidable difficulties, for the doses used were large and probably unsuitable for ambulant people not under skilled observation.

THE FORMATION OF AQUEOUS HUMOUR

ONE of the most tantalising riddles of physiology is the way in which the body manipulates its fluids.[10] The sheet anchor of any theoretical approach is the idea of the semipermeable membrane, one type of which, allowing the transfer of water but not of dissolved salts, we used to try to make at school by precipitating copper ferrocyanide in the walls of a porous pot. A collodion sac goes a stage further in allowing the passage of dissolved inorganic ions but not larger molecules such as proteins. Since proteins are as a rule combined with ions the natural tendency of the latter to distribute themselves evenly throughout the water on the protein and non-protein side of such a membrane is disturbed by the affinity of some of them for the protein. When the system has reached stability the relative concentrations of the various solutes and their components accord with the law known as the Donnan equilibrium. The behaviour of many biological membranes approximates to that of collodion, but almost invariably there are reservations. Although lymph contains some protein its relation to blood is largely determined by the foregoing considerations; but one must keep a wary eye on a "membrane" (the capillary wall) which often allows blood-cells to pass through it. Then there are membranes with idiosyncrasies—that of the erythrocyte, for instance, very competently holds potassium ions inside and keeps out sodium ions, but chloride and bicarbonate ions pass freely. In examples like this there is no suggestion that the membranes are other than passive, or that it is necessary to do more than achieve an understanding of their inherent properties, always bearing in mind that these may be influenced by a change in the immediate environment.

In other cases membranes are definitely not passive. In the blocked duct of a salivary gland the fluid pressure may exceed the arterial blood-pressure; this means that the cells of the alveoli have done something more than passively transmit substances from the blood, via the tissue fluid, to the duct. They are active. Similarly, in the kidney, the selective excretion of some blood constituents, the conservation of others in mutually varying proportions and the high concentration of the urine, show that the tubule cells are active and not passive. In the last few years there has been much interest in the aqueous humour; first accepted as a secretion of the ciliary glands, then as a transudate, more recently again as a secretion, it clearly demands the careful investigations carried out by Duke-Elder, Quilliam and Davson.[11] Until this point is settled theories of glaucoma must rest on an insecure foundation. These workers, who have unfortunately been interrupted by the war, have collected sufficient results to warrant a review of the whole question, although they are unable to give a final answer to it. Their contention, based on careful comparative estimations of significant constituents of aqueous humour and serum, is that "the variations from expectation are neither so large nor so consistent as to warrant the supposition of a secretory activity." Moreover, results obtained from eyes poisoned by cyanide and from dialysis of serum through a collodion sac led them to similar conclusions. The behaviour of such inert systems does not approximate sufficiently closely to that of the living eye to prove a purely physical process, but it is similar enough to make the postulate of secretion questionable. The findings of these workers are against recent trends, but they have mobilised sufficient evidence of a critical kind to justify a stay of judgment.

PSORIASIS UNCONQUERED

MANY methods of treatment for a disease imply that none is effective. There is no specific remedy for psoriasis, but this does not mean that the unfortunate patient can get no relief from his affliction. Probably the time-honoured method of applying an unguent containing tar to the patches, after removing the scales in a hot bath, and of giving him a small dose of arsenic by the mouth is still as good as anything. From time to time, however, elaborate remedies are suggested and in a stimulating paper Madden[12] deals with some of the more modern of these. He treated 112 patients with psoriasis over a period of 2 years with one or other of the following remedies: vitamin D, which proved valueless; vitamin B_1, which improved a few but failed to cure their relapses; liver extract and dilute hydrochloric acid, which were of no striking value; œstrogenic substance, which failed; bismuth salicylate in oil, which caused a slight improvement in a few cases; a low-fat diet combined with vitamin B_1 and liver extract, or anterior pituitary extract, or adrenal cortex extract, all of which helped in some cases but probably not more than the low-fat diet on its own would have done; vitamin-B complex, brewer's yeast, vitamin C, sulphanilamide, anterior pituitary extract, and adrenal cortex extract, all of which were useless. It is healthy to receive a negative report of this kind on a series of vaunted and unproven remedies.

THE committee set up at the end of July, under the chairmanship of Lord Horder and the vice-chairmanship of Surgeon Rear-Admiral G. Gordon-Taylor, to consider the protection of the fighting services in the field has been collecting evidence. An interim report has now been prepared and has been forwarded to the Prime Minister and the ministries interested.

WE regret to announce the death on Oct. 8 in his eightieth year of Sir HENRY HEAD, F.R.S., consulting physician to the London Hospital and former editor of *Brain*.

9. Meehan, F. and Merrillees, C. R. *Med. J. Aust.* July 27, 1940, p. 84.
10. *Lancet*, 1940, 1, 794.
11. Duke-Elder, S., Quilliam, J. C. and Davson, H. *Brit. J. Ophthal.* September, 1940, p. 421.
12. Madden, John F. *J. Amer. med. Ass.* Aug. 24, 1924, p. 588.

Public Health

MASS INOCULATION AGAINST THE TYPHOID GROUP

BY H. C. MAURICE WILLIAMS, M.R.C.S., D.P.H.
MEDICAL OFFICER OF HEALTH FOR SOUTHAMPTON

THE Southampton borough council is, I believe, the first public health authority to establish public clinics where inoculation against the typhoids is offered free to any person living within the borough boundaries. At the beginning of the war I advised my public-health committee to apply to the Ministry of Health for permission to establish such clinics, but it was not until a recent circular letter from the chief medical officer was received advocating this procedure, that I was able to do more than arrange for all the medical, nursing, and domestic staff in the municipal hospitals and institutions in my area to be protected, together with the staff of a voluntary hospital.

It did not need much imagination to visualise the public-health problem that would be encountered in vulnerable areas when indiscriminate bombing began. Water mains and sewers often lie close to each other, and if both were fractured pollution of water would be probable. Chlorination at the source does not leave enough residual chlorine to have any effect on the water in distant mains. In initiating the scheme, I invited members of the local medical advisory committee to discuss the question, and I was promised the coöperation of the local practitioners. The town being divided by a river, I decided to establish a centre on each side of it, holding an afternoon and an evening session at each. The centres are in the school clinic buildings. An advertisement of the scheme was inserted several times in the local press. This announced that the council had decided to provide clinics for the protection of the population against the typhoid group of fevers, and asked those wishing to be inoculated to attend at one or other of the clinics between stated hours, when inoculation would be administered free of cost by one of the council's medical officers. Similar advertisements are being exhibited in all the trams and 'buses owned by the corporation, and in the local cinemas, through the kindness of the proprietors.

I asked all the chief officers of the corporation departments to submit a list of members of their staffs who desired to be inoculated. Wardens distribute from house to house in their districts a letter indicating the advisability of inoculation. Similar facilities have been offered to the staffs of first-aid posts and other A.R.P. depots, as well as to industrial establishments. To save them the inconvenience of attending at a clinic I have offered to send a medical officer to carry out the inoculations at their place of employment.

Private practitioners in the town have been informed by a circular letter that on making a request to the public-health department they will be supplied with 25 c.cm. of vaccine when they are able to collect 15 patients. The vaccine is supplied free, and the public-health department asks that records similar to those filed at the clinics should be kept and returned on completion of the 15 cases. One side of the record cards used is ruled under headings to show the name, age, address, occupation and history of the patient, the dosage and other treatment he receives, his reactions, and the signature of the doctor giving the injections; on the reverse is the following short certificate to be signed by the patient.

I wish to have myself/my child..... inoculated against the typhoid group of fevers by the means which the medical officer of health or his representatives consider most suitable. I understand that inoculation sometimes produces local or general reactions which may temporarily incapacitate, but I agree that the mayor, aldermen and burgesses of the Borough of Southampton, or any of their officers, shall not be held responsible for any such reactions or incapacity or any loss in consequence thereof or arising thereout.

Accompanying Sir Arthur MacNalty's circular letter the Ministry of Health issued instructions relative to dosage and procedure. During the first two weeks 804 people attended at both clinics for their first injection. The number would undoubtedly have been greater but for the fact that during two of the sessions an air-raid warning was in operation. Twelve 25 c.cm. bottles have already been issued to private practitioners, which covers an anticipated number of 180 patients. Before the end of the present month I anticipate that we shall have completed the protection of 2000 people, and before the end of the year we hope to have protected 10,000.

The vaccine, which is being supplied through a Government laboratory, contains 1000 million *Bacillus typhosus*, and 500 million each *B. paratyphosus* A, B and C per 1 c.cm. It is administered by two injections of 0·5 and 1 c.cm. for adults, given at an interval of 14 days.

On occasions when we have suspected that the water in certain mains has been polluted, we have immediately dispatched a health-department van with a loud-speaker attachment to warn the residents in the particular roads affected. This is in addition to a public notice which frequently appears in the press warning all persons to boil their water following a raid until such time as the medical authorities are able to indicate that there is no pollution.

I have to thank Dr. J. T. Duncan of the Government laboratory for his advice.

Mosquito Control in England

THE Ministry of Health has at length recognised that, apart from the rôle they play in malaria, the small biting insects known as mosquitoes or gnats are a great public-health nuisance, and has issued a memorandum on mosquito control.[1] Advisers to local authorities, to whom the memo is chiefly addressed, will be somewhat alarmed at the extent and character of the measures suggested and may feel reluctant to advise their authorities to adopt them. Indeed, if all the recommendations were presented to a council for adoption the matter would be allowed to lie on the table and nothing would be done. But if the memo is read carefully, especially by someone acquainted with entomology and who has had personal experience of biters in his own locality, it will be seen that what may be required locally to stem the menace is well within practical possibility.

When Ross had proved that the mosquito was an obligatory conveyor of the malaria parasites it seemed that a comparatively easy means was available to free mankind from what is, and probably always has been, the greatest menace to human health. But many species of anopheles, differing widely in habits and habitats, can harbour the plasmodia, and experience has shown that measures satisfactory in one locality are useless in others, and that what succeeds at one time and against one species of anopheles fails at other times and against other species. So the control of malaria has fallen mainly into the hands of entomologists who by studying the natural history of the mosquitoes can find out ways of attacking the various species when, where and how they are most vulnerable.

In Britain we have 29 species of anophelines and culicines, several of which can convey malaria, but of recent years only one variety of one species, *Anopheles maculipennis atroparvus*, has had much say in causing native malaria. Since the last war some 500 cases of malaria proved to be locally contracted have occurred in Britain. Most of them were detected in 1917–22 in the low-lying coastal districts of east and south-east England where the offending mosquito is most common, and were due to the return of soldiers infected abroad.

The Ministry of Health is now less concerned with the risk of malaria than with the annoyance, loss of health and interference with labour caused by the bites of all anophelines and culicines which are natives of this country and fond of man. Of the 29, only 21 are of much consequence, and these are locally distributed, so it is rarely necessary to wage war on more than a few species. The damage done to man by the insects is solely through the bites of the adult females. These ladies are somewhat capricious in their choice and do not attack all humans indiscriminately, but few if any people are not favoured by some species and many are attractive to all. It is possible that those exposed to continuous biting develop a partial immunity, for newcomers to a

1. Memorandum on Measures for the Control of Mosquito Nuisances in Great Britain. By Lieut.-Colonel J. A. Sinton, V.C., M.D., adviser on malaria to the Ministry of Health, and P. G. Shute, F.R.E.S., Assistant adviser. H.M. Stationery Office. 6d.

district seem to suffer more severely than old residents, and townfolk when they go into the country appear to be the worst bitten ; or perhaps they only make most fuss about it. No doubt the increase of gardening and allotment cultivation has brought gnat-bites into prominence. The main trouble with these is that their itching prevents the victim from sleeping, but they may be infected at the time of their infliction, and have been known to be the starting point of erysipelas or scarlet fever.

An essential preliminary to mosquito control is identification of the species which is topically and locally prevalent. Medical officers of health can be expected to arrange for the collection and transmission of specimens, but not to identify them ; this will be done free of charge either by the Ministry of Health Malaria Laboratory, Horton Hospital, Epsom, or by the Entomological Department, Natural History Museum, South Kensington. Having identified the species, the best means of attacking it can be found by reference to the memo. It is important to pay attention to the times of the year at which the various measures should be employed, for insects are punctual in their habits. Ingenuity and local knowledge are required to bring the work within feasible limits. Broadly speaking, the British anophelines and culicines are either woodland or coastal species, the former breeding in forest pools or puddles and the cavities of hollow trees, and the latter in marshy pools. All species show some predilection for certain breeding grounds which can be turned to advantage by those who know the locality. Two species which like brackish water—*Aedes caspius* and *Aedes detritus*—are apt to be a serious nuisance in coastal districts, and since their breeding places are numerous and may cover wide areas there is little hope of suppressing them without extensive drainage or reclamation schemes. These species have been particularly vicious this year, probably because their breeding grounds have not suffered by the long dry summer. The woodland species have had a less easy time owing to the drought, so the coming months will be favourable for an onslaught on their larvæ.

Something valuable can be done in reducing mosquitoes by attacking the adults when they are hibernating. As the weather gets cold many specimens of mosquitoes (the females only) enter buildings to pass the winter. They like pigstyes, cow sheds, outbuildings, cellars and outside w.c.'s, and prefer places which are dark and dirty and amply decorated with cobwebs. They can be killed by spraying, but vast numbers can be destroyed by sweeping. Here the housewife can help materially by carrying out her spring cleaning in November when the mosquitoes have retired to roost, instead of waiting until Easter when they will have departed for their breeding grounds.

Sophistication of Foods and Drugs

The report for 1939 of Mr. H. H. Bagnall, B.Sc., analyst to the city of Birmingham, reveals the infrequency and uninteresting character of modern food sophistication. Of 5352 samples of foods examined, 295, or 5·5% were found "incorrect," of which 239 were watered milk, 5 watered spirits, 17 margarine substituted for butter, and 7 steak and kidney pies lacking kidney. These are the only food offences which are at all common now, apart from faulty labelling and the use of preservatives not permitted or in excess of what is permitted. The only one which is of any serious health consequence is watering milk. Of the 2869 samples of milk analysed in Birmingham, 239, or 8·3%, were below standard, all through the addition of water. We must not conclude from this that a twelfth of the milk sold in Birmingham is diluted, or that one dairyman in twelve is a rogue, for food samplers look out for milk open to suspicion. When we are told that there were eight serious cases of adulteration, all ending in fines varying from £7 to £35, we get a more just idea of the real extent of sophistication. The fines were the highest for several years, but they might well have been higher still, for watering milk is a crime which has grave consequences. Watering spirits will not perturb the health officer, and the substitution of margarine for butter, which is most common in "bread and butter" sold in cafés, is not likely to do much damage to the nutrition of the nation. Gone are the days when the manufacture of coffee beans from chicory, sawdust and plaster-of-paris was a lucrative industry, for good food is hardly less dear than its substitutes and food inspectors are sharp and their hand heavy. There is in fact no health service which has done its job better than the suppression of adulteration, but new methods of sophistication crop up occasionally and watch must be kept for acts of carelessness or stupidity.

It has always been puzzling why the control of the sale of drugs, so far as their genuineness is concerned, should be linked with that of foodstuffs, but even in the latest act of 1938 the two go together. The commonest drug offences are ammoniated tincture of quinine deficient in quinine, and sweet spirits of nitre lacking something or other. In Birmingham in 1939 there were 19 not genuine out of 471 drug samples analysed. Of these 3 were formalin tablets, 5 sulphur tablets, 3 fluid magnesia, 3 ammoniated tincture of quinine, and 1 each of bismuth lozenges, borax and honey, white precipitate ointment, Seidlitz powders and milk of sulphur. Not an imposing list.

INFECTIOUS DISEASE IN ENGLAND AND WALES

DURING THE WEEK ENDED SEPT. 14, 1940

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0 ; scarlet fever, 1384 ; whooping-cough, 1106 ; diphtheria, 1027 ; enteric fever, 93 ; measles (excluding rubella), 6179 ; pneumonia (primary or influenzal), 440 ; puerperal pyrexia, 116 ; cerebrospinal fever, 122 ; poliomyelitis, 47 ; polio-encephalitis, 6 ; encephalitis lethargica, 4 ; dysentery, 33 ; ophthalmia neonatorum, 91. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Sept. 13 was 1443, made up of: scarlet fever, 200 ; diphtheria, 195 ; measles, 305 ; whooping-cough, 24 ; enteritis, 41 ; chicken-pox, 37 ; erysipelas, 32 ; mumps, 4 ; poliomyelitis, 1 ; dysentery, 2 ; cerebrospinal fever, 23 ; puerperal sepsis, 25 ; enteric fevers, 29 ; other diseases (non-infectious), 60 ; not yet diagnosed, 66.

Deaths.—In 126 great towns, including London, there was no death from smallpox or from enteric fever, 2 (0) from scarlet fever, 7 (1) from whooping-cough, 14 (0) from measles, 41 (1) from diphtheria, 62 (3) from diarrhœa and enteritis under 2 years, and 9 (0) from influenza. The figures in parentheses are those for London itself.

Liverpool and Plymouth each reported 6 deaths from diphtheria. There were 5 deaths from measles at Liverpool. Liverpool and Hull each had 9 fatal cases of diarrhœa.

The number of stillbirths notified during the week was 207 (corresponding to a rate of 38 per thousand total births), including 20 in London.

Aequam memento rebus in arduis servare mentem has generally been thought to be pretty stiff advice ; but the students of the Massachusetts State College at Amherst have gone one better.[1] On Sept. 21, 1938, a hurricane swept over Amherst, at the very hour when the freshmen were due to have the mental test commonly employed at that college to determine the level of their intelligence. An intrepid psychologist proceeded with the test in spite of falling trees, the "characteristic weirdness both of sound and vision which prevailed" and a lack of illumination due to failure of electricity (and no doubt partially remedied by hurricane lamps). The freshmen, not only intrepid but at the top of their form, turned in answers to the tests which were 20% better than the previous ten-year average of the freshmen classes tested. From this it might have been inferred that they were both calm and clever, but further tests were done, under more normal conditions, and they did no better than previous classes ; their cleverness therefore was average rather than superior. Why then did they do so well in the storm, excelling themselves amid the welter of the elements ? The explanation is ozone. Dr. C. A. Peters found that there were relatively large quantities of ozone in the air during the hurricane, and he says that "when all conceivable factors are considered it appears plausible that the unusual amount of ozone in the air during the hurricane served as a mental stimulant to the freshmen." If he is right we may yet see Wimshurst machines installed in legislative chambers and the translation of universities to the seaside.

1. *Science*, May 10, 1940, p. 450.

In England Now

A Running Commentary by Peripatetic Correspondents

I HAVE been looking at the latest threepenny pamphlet of the National Institute of Industrial Psychology which tells of success in the rapid training of industrial workers. A skilled operative selected to act as teacher is first shown how to draw up a "book of words" crystallising the practical experience of that form of industry. He next studies the movements of the most efficient workers and records the easiest and best methods of delivering the goods. Armed with this "necessary knowledge" and this "standard procedure" he proceeds to train the body of workers. The pamphlet gives some astonishing examples of increased production as a result of this scheme which at first sight seems to cut across the whole doctrine of craft apprenticeship. But it is essential not to confuse the two issues—craftsmanship and repetitive production. Craft cannot be acquired by drill. It is a function of technical ability, artistry and skill. It takes years to acquire. No two craftsmen employ the same method to achieve similar results; the practice of surgery is convincing evidence of that. What the N.I.I.P. are concerned with is the vast mass of craftless people who are called on to produce in a hurry a complicated machine by means of team work in which each individual plays a prearranged and very limited rôle. For such as these drill is essential and drill can be effectively reinforced by motion-study and the development of the least complex and least fatiguing series of movements. To work like this for a time, such as in an urgent rearmament drive, is one thing—and a very good thing if planned wisely. To do it all one's life as part of an industrial system is another thing altogether. In the latter case there is not the emotional release that comes in war-time from fighting on the industrial front; satisfaction is then to be found in leisure and cultural pursuits. It is hardly the time to consider whether life can be divided into work and leisure as distinct from work as a part of life, or whether the mass-production industrial state is an object to be desired. Time and motion study—yes, certainly for war work—afterwards with wisdom it can be modified to allow mankind to produce efficiently and yet not lose its soul. For the time being, however, we must concentrate on winning the war and this *is* an effective method in skilled hands.

* * *

At night I live in a cellar in the City. Sometimes I have a companion, but when I have none, though I am cosy enough when I get there, I loathe to return to it. So I go to my club instead for a late cup of tea and sit in comfort in a corner of the library reading, and always intending to start on my homeward journey of about a mile before the guns begin to fire; but I never do. This walk is not as dangerous as one might suppose. There are lulls in the firing that carry me a good way. Between the West End and the City are many shelters into which I could go, but don't. There are plenty of doors and entrances which are good cover if one heard an extra fearsome noise. This evening the walk has been unusual, because of the night; after the bright cold day with the nip in the air at sundown, the air was very clear. Starlight night above, the moon in its first quarter shone horizontally on the tops of the buildings leaving the depths in darkness, reminding me not of London, but the Middle East—Jerusalem, or the little town half-way up Mount Olympus in which I lived for a while. Above the buildings other rays from the searchlights shot up. Just as I had got opposite Bush House the guns burst out again furiously, adding big yellow momentary stars. I wanted to dodge under cover, but found on this side of the street no cover whatever. Great offices, their doors flush with their posts, rejected me; the older small ones, on the other side, had pillars to their entrances and doors recessed into their depths. And now that I wanted to take cover the Strand seemed very wide. The traffic was going faster, its sound had risen a note or two. I could never have imagined that, with shell bursting overhead, fast-moving traffic in the dark should have appeared as an impassable obstruction, but it did. To cross even Fleet Street with a lampstand in the middle was an adventure. In the end I was glad to reach my cellar, though I had enjoyed my walk and I believe the mild degree of fear to which I had been subjected had increased my enjoyment; I can feel that I am really in this war. Perhaps when a big bomb falls within a quarter of a mile of me I shall change my tune.

* * *

I was under the arched doorway inserting my key in the lock of my cellar when a policeman went by. "Cool" he said, "There's some more of it." "More of what?" I asked. "Shrapnel," said he; "it's tumbling about all over the place." I had heard none, but we are picking bits up all the time. Everyone is collecting them as souvenirs for their grandchildren. We have a plate-full; some have a meat-dish full. No doubt they can later be handed over for re-issue to the guns and I suppose really we oughtn't to be picking them up at all. But I would not advise anyone without a tin hat to remain in the street while firing is going on; and he who has a battle-hat and does not deign to wear it, he ought to have it taken away and given to another. I bought three for my household on the outbreak of the war and was laughed at; but anyone who had experience of last time should have done the same; and they don't laugh now. The only problem is to decide when going out whether to take another hat or not. If you do it becomes a nice point to choose when to change hats. When its raining, of course, the tin hat makes an excellent umbrella.

* * *

Many air-raids had passed and brought havoc pretty close to our doors, and we had all wondered what it would be like when our turn came. Preparations for the evacuation of upstair wards by abnormal routes had been rehearsed. And then one dark night the crash came. It made the whole great building lurch. Those congregated in the reception-room at the end nearest the point of impact were propelled, most of them on all fours, towards the centre of the hall, but immediately did an about turn and ran towards the central stairway, only to find it demolished from top to bottom, together with the lift. The normal access to more than 50 patients and their nurses was completely cut off. The wards affected had had their doors blown in and were filled with the usual fine dust, like a grey smoke. A small fire on an upper landing was extinguished by agile students with water in tin hats. In quick time all the patients were brought to safety on the ground floor by the outside fire-escapes, some on stretchers, some in the arms of doctors and students. Everyone—nurses, students, members of the works department fire-squad, and above all the patients—behaved calmly and there was no panic or confusion. One frail little man with an empyema said to his rescuer, a member of the staff who had scarcely counted himself in the sere and yellow, "O, Sir, you shouldn't have done it, a man of your age. Supposing you had fallen down the iron stairs and hurt yourself—I should never have forgiven myself!" One resident was trapped on a top floor with a bad scalp wound and was rescued by the fire brigade. He is doing well. There were no other casualties. We were reminded of an old cup-tie slogan, "——'s patients never die; they simply fade away."

With reduced accommodation and staff the hospital is carrying on as a C.C.S. on the ground floor. All out-patient services and quite a good show of lectures and classes have been maintained. Research is not dead. On the day after the bombing two enthusiasts with ladders and rock-climbing tackle were seen rescuing their papers and damaged apparatus from their shattered laboratory on the third floor. Plans for a closer study of the problems of shock and blast injuries are maturing.

We are all greatly impressed by the courage and cheerfulness of our working-class friends. "We can take it" is the prevailing attitude. The conditions in which they spend their nights in the local deep shelters are grim and would shock a Skipper sardine. Many return to windowless and roofless houses to camp out by day. Their menfolk issued from their holes and hide-outs to help the hospital as soon as it was hit. One young woman whose labour started in a shelter went home, and when visited there by a member of the obstetric staff said, "I think I can have my baby here, Sir. I think I shall be all right." Her house had no unbroken windows and the end of the street was roped off for an unexploded time-bomb. Fortunately there was a bed in the hospital, where a quick-turnover maternity service is maintained.

To wander at night round London—especially the East End—recalls the memory at every step to the night life in towns "back of the line" in France in the last war. Black, deserted streets, in which the flashes of gunfire reveal strange and unexpected obstructions. Suddenly one comes upon a knot of men in steel helmets, talking quietly in a doorway. As in Ypres or Albert, the local gossip is passed on—what has fallen, places to avoid, the advantages and disadvantages of the local shelters (we called them dug-outs then)—all just as it was 22 years ago. Up comes a warden with the news that "something has fallen in the next street. He "doesn't think it's gone orf, but it's hissing horribly." We go along to investigate, with the greatest reluctance in the case of at least one member of the party. On going into the street a loud swishing is certainly heard and we find ourselves ankle deep in water. The mystery is revealed as a burst water-main spouting as high as the roofs of the houses. We thankfully take leave of an impassioned argument as to whether or not it has in fact "gone orf," to investigate more shelters. Groping round for the doorway of a surface shelter, we eventually find it, like all the others, as empty and deserted as an abandoned battery position. Following directions designed to lead us to bigger game we find a street as apparently deserted as the others. Search reveals a chink of light under a door and suddenly inside is a brave new world—bright light, terrific heat and pullulating life.

On the way back, as we stop in a doorway for shelter from a patter of shrapnel or the flare which seems malignantly engaged in revealing *you*, Dr. ABC, to the "hovering" plane, up rattles the inevitable lost battery-wagon, now an auxiliary fire-engine. "Can you tell us where XYZ fire sub-station is? We are from B"—a borough on the far side of London. We cannot, but a warden says he thinks it is about 12 turnings on the left, and everyone disperses into the night.

* * *

The epidemiological problems of life in large shelters seem to be the reverse of those of the evacuation at the beginning of the war. Then it was feared that immune carriers from the towns, introduced into a non-immune population, might produce epidemics. None occurred, and the generally accepted explanation is that the herds into which the potential infection was introduced were too small and scattered for epidemic spread to occur. Now we are seeing persons who may have been living in comparative bacteriological isolation, such as infants, old persons or the complete families of small shopkeepers and respectable artisans, forcibly exposed to the bacteriological flora of large mixed herds. What will be the effects? We are already seeing one result in what appears to be the prevalence of sore throats in shelters. Most of us are too busy to study these phenomena as they should be studied. In one shelter housing so many people that the final "O" is usually taken for a typist's error, the inhabitants range from coloured seamen to pretty girls in siren suits—from Hieronymus Bosch to Dali in fact. It would make a perfect test-tube for epidemiological observations. The situation is complicated by lack of ventilation. In the Underground there is at least some through-ventilation via the tunnels and stairways, and in the super-shelter referred to the atmosphere, though foul and cold, is not quite stagnant because the entrance cannot be closed. But some deep shelters I have visited seemed to be hermetically sealed and the air is so hot and of so low a humidity that the throat becomes dry very quickly. A fan or two would at least relieve the heat stagnation. Some scientific observations on the air in shelters about dawn would be of the greatest interest.

What has happened, by the way, to the bands and music which we were promised? I was forcibly reminded of this when the all clear went in a big shelter. Where we lay it could not be heard but some sportsman sketched a reveille on a bugle and as the ragged notes cut the dank air you could almost see our morale improving and General Gloom with his attendant microbes Dirt, Stink and Hunger creeping away into a corner. Out we trailed to marches on a radiogramophone, with our tails well up.

* * *

That north-west town that has been raided so often has not caught it anything like London, but part of it caught it pretty badly in a raid last week. I saw one building in a terrible state. I noticed vaguely that the walls were standing but it was the inside that was in such a mess. On one of the walls was a notice saying Business as Usual, so since it seemed to have been a public house I walked in. "A bitter, please," I said to the proprietor who came forward at once, "and I hope you will have one with me; it is wonderful of you to keep open" He looked rather puzzled and said it wasn't quite time yet. I waited at the bar for midday to strike (it was a Sunday), and I noticed how tidily they had cleared up the debris. "It must be an awful worry to you," I said, and he agreed that it was a bit of a bother. He was still looking at me in a queer way, and when he served my drink he didn't seem at all keen on having one with me. "Are the brewers going to compensate you for your house being knocked about like this?" I asked. "Whatever for," said he, "they didn't do it, I did it myself." This shook me a bit, but I tried to humour him. After all, the shock must have been enough to upset anybody. "When did it happen?" I asked. "Last September," said the publican. This was too much and I told him pretty crossly not to tell me that there had been any bombing last September. He smiled. "The house hasn't had a bomb on it," he said, "I decided to rebuild it last year, and got it half done when the war held things up. We keep open so as not to lose our custom. Have a drink on me."

Parliament

ON Oct. 8 Mr. CHURCHILL gave the House of Commons another of his illuminating reviews of the war situation. He maintained his refusal to assume the rôle of a prophet; no-one, he said, could predict how this terrible struggle would run its course, how far it would spread, or how long it would last. Death and sorrow would inevitably be the companions of our journey; hardship our garment; constancy and valour our only shield. He could not hold out any immediate prospect of a complete and effective answer to night bombing, but he pointed out that all through the past month there has been a steady decline in the casualties and damage to so-called vulnerable points. Whereas when we entered the war we had expected to sustain losses which might amount to 3000 killed in a single night, and 12,000 wounded night after night, and hospital arrangements had been made on the basis of 250,000 casualties merely as a first provision, the actual experience of the air blitzkrieg had been much more favourable. Up to Sept. 29 about 8500 had been killed and 13,000 wounded as a result of air bombing. The figures of those killed and seriously wounded have declined from 6000 in the first week to just under 5000 in the second week and to under 3000 in the last of the four weeks. The House sent up a tremendous cheer when Mr. Churchill remarked that neither by material damage nor by slaughter would the people of the British Empire be turned from their solemn and inexorable purpose. He rejected the demand for bombing reprisals, except in so far as they were directed to the destruction of the sources of enemy war effort. Mindful of the large and growing problems of public health which are inevitably associated with the air war, and the displacement of large numbers of people from their normal methods of living, the Prime Minister gave a firm assurance that far-reaching measures were being taken not only to guard against the outbreak of epidemic disease but also to see that the stamina and morale of the people—especially in London and the great towns—were not undermined by the abnormal and primordial conditions. A wide-spread organisation of relief for those whose homes were smitten was, he said, already in being. Greater efforts were also being made to see that the provision of shelters was increased and made more effective.

* * *

After Mr. Churchill's speech members in all quarters of the House made a praiseworthy effort to put their ideas into the common pool for the assistance of the Government. The debate, while indicating no desire to criticise merely for the sake of criticism, made it clear that irrespective of party allegiance members are keenly anxious that the sufferings of their constituents should not be added to by lack of coördination between the

local authorities and the central government. Great stress was laid on the importance of measures for preventing disease in London and the large towns during the coming winter.

Mr. MALCOLM MACDONALD, Minister of Health, did his best to reassure the House on the principal points raised. He freely admitted that the plans made before the blitzkrieg had shown many faults as soon as the heavy bombing of London began. Two main mistakes had been made. First, too much had been left to the local authorities; and secondly, the circulars issued to those authorities had suggested too low a provision in the centres where people had to stay for considerably longer periods than the 48 hours or three days originally anticipated. But having made these admissions he protested against exaggerated statements which had been made by some of his critics. Hot meals were being provided at least once a day in the centres for the homeless. The process of getting people away from the food and rest centres and into houses was now going ahead. At the peak of the congestion in the food and rest centres there were 25,000 people there in the London region. That figure has now been reduced to 10,500. A large movement of rebilleting these people was going on every day.

Examining the problem of further evacuation from the vulnerable areas, particularly of mothers and children and old and infirm people, Mr. MacDonald pointed out that while accommodation still existed in the reception areas there was a limit to it, and the Government had desired to give priority to the classes who needed it most—mothers, and children of school age or under. The Government were considering the creation of hostels, particularly for young girls and boys who were over school age. The House could be assured that all the authorities concerned would not allow their energies to slacken until they had given the homeless people the proper care they deserved.

QUESTION TIME

Vegetarians and their Rations

In reply to a question Mr. R. BOOTHBY, parliamentary secretary to the Ministry of Food, said: The position of vegetarians has been carefully considered by the food rationing (special diets) advisory committee of the Medical Research Council. In the light of the restriction in fat rations which came into force in July last, the committee have advised that no extra fat rations are necessary, and in view of this authoritative opinion the Minister is not prepared to authorise the exchange of meat and bacon coupons for an extra allowance of margarine and/or butter.

Vitamin B_1 in White Flour

Mr. R. R. STOKES asked Mr. Boothby how soon synthetic vitamin B_1 would be inserted in all white flour; and whether he was satisfied that bread made from whole-wheat meal was now available in all districts at the same price as white bread.—Mr. BOOTHBY replied: It is hoped that vitamin B_1 will be available in sufficient quantities to fortify all white flour by next spring. Bread made from high-extraction whole-meal flour is available at the same price as white bread in most districts.

Canned Foods for the Army

Mr. G. MANDER asked the Secretary of State for War what steps had been taken to carry out the recommendations contained in the twelfth report from the Select Committee on National Expenditure with regard to the feeding of the Army, the greater use of canned foods to supplement the existing normal ration, and the appointment of a departmental committee of inquiry.—Mr. R. K. LAW, financial secretary to the War Office, replied: As regards the feeding of the Army, an experiment will be made of providing the ration for certain smaller static units largely by tinned food. The Minister does not think that a committee of inquiry is necessary. But he has decided with the concurrence of the Chancellor of the Exchequer to invite two business men of experience to consult with the management of Navy, Army and Air Force institutes and advise whether and by what means the services which the institutes provide for the troops can be extended and improved.

Employment of Disabled A.R.P. Workers

Mr. H. J. PARKER asked the Home Secretary whether the provisions of the Disabled Men (Facilities of Employment) Act, 1919, would be extended to air-raid precautions workers who might be partially disabled by an accident and find it difficult to get work.—Mr. HERBERT MORRISON replied: If it should be found that such men are hindered from getting work because their employment increases the industrial accident risk, the question how to prevent them being placed at a disadvantage on this account would certainly have to be considered, but experience of the operation of the Act of 1919 showed that there is little, if any, ground for the fear that the employment of disabled men may increase the accident risk.

Central Medical War Committee

Mr. T. E. GROVES asked the Minister of Health what authority the officers of his department attached to the Central Medical War Committee as observers had; how many of such observers attended each meeting of the committee; and what action was taken if the advice of these observers was not adopted by the committee.—Mr. M. MACDONALD replied: The officers in question have authority to assist the committee with their advice and generally to keep in touch with the proceedings on my behalf. Normally two such observers attend each meeting. If the situation indicated in the last part of the question were to arise, the action taken would depend upon the nature of the issue involved.

Obituary

MAUDE ELIZABETH SEYMOUR ABBOTT

B.A., M.D., F.R.C.P. CANADA, L.R.C.P.E.

Dr. Maude Abbott died in the Neurological Institute of Montreal on Sept. 2. She was in her 72nd year and had been ill for about two months. Dr. Abbott held a unique position in Canadian and world medicine. A pioneer medical woman, she was a student of Bishop's College, Lennoxville, where she obtained her M.D. degree in 1894. In 1890 she had taken the B.A. degree of McGill, winning the Lord Stanley gold medal for general proficiency, but in those days women were not admitted to the medical faculty of that university, of which later she was to become a distinguished member and from which in 1936 she was to receive the honorary degree of doctor of laws. After qualification, Dr. Abbott continued her studies in Zürich, Vienna and Edinburgh, where she took in her stride the Scottish conjoint diploma. In 1898 she was appointed assistant curator of the medical museum of McGill University and curator two years later. From 1905 until 1912 she held the post of research fellow in pathology at McGill, and was then appointed lecturer in pathology. In 1923 she was granted two years' leave of absence from McGill to reorganise the work of the departments of pathology and bacteriology in the Women's Medical College of Pennsylvania, and to correlate clinical and pathological teaching and the development of medical research there. Dr. Abbott retired from her official duties at McGill in 1936, but continued with her research. Among pathologists she was perhaps best known as secretary-general and moving spirit of the International Association of Medical Museums. Her enthusiasm for the medical museum was immense; her influence was widely felt, in Europe as well as in America.

Dr. Abbott's other abiding interest in medicine was the study of congenital heart disease. She contributed this section to Osler's Modern Medicine and to Nelson's Loose-Leaf Medicine, and in 1936 she published her own Atlas of Congenital Cardiac Disease, with the promise of a larger manual to follow. An intimate friend and admirer of Osler, she had lately completed a comprehensive bibliography of his works.

Dr. Abbott came of a family which holds an honoured place in Canadian public life. She was proud of her English stock—her forebears belonged to Little Strickland in Cumberland—and she had many close friends in this country. Kindhearted and generous to a fault, she combined a quiet simplicity of mind with great intellectual ability and an energy and enthusiasm which were at once the admiration and despair of her friends. In her long and happy life she had passed through much tribulation—she had had "misfortunes great and sma', but aye a heart abune them a' "—and the memory of her joyous, vital, enthusiastic personality will ever be treasured by those of us who were privileged to be her friends.

M. J. S.

Letters to the Editor

A CHRISTMAS APPEAL

SIR,—The war has brought many changes into our lives, but as winter approaches may I remind your readers, who have so generously responded to my Christmas appeal for many years, not to forget or overlook the gifts which the Royal Medical Benevolent Fund endeavours to distribute to all its beneficiaries. These old people have had their share of hardships. For the most part they live alone in lodgings or in bed-sitting-rooms. Some have had to move out of their rooms by the coast; those in London and other towns have had anxious days and nights. I ask your readers to remember these medical colleagues, their widows and families, and to help us to send to each a gift of thirty shillings this Christmas as a token of our sympathy. The extra money brings comfort and warmth into many lonely sad lives and the feeling of "not being forgotten."

Donations should be sent to the new address of the Royal Medical Benevolent Fund, 1, Balliol House, Manorfields, London, S.W.15, and cheques made payable to "R.M.B.F. Christmas Gifts Fund." Please forward donations now to enable the gifts to be distributed before Christmas Day.

THOS. BARLOW,
President, R.M.B.F.

NEUROTICS IN THE FORCES

SIR,—Will you allow me to disagree vigorously with Dr. Kerr's pathology of neurosis and his physical-jerks psychotherapy? Does he really contend that the precursors of neurosis—which in any case is not an entity—are muscular imbalance, general untidiness, poor posture, &c., or that accuracy in sensation and in action create mental confidence? Mental confidence in what—an examination, an air-raid, tight-rope walking, or the particular exercise in which this skill has been acquired? Even in the latter great precision in performing a specific task may not give confidence, at least in anticipation. The famous Victor Trumper was reputed to be like a cat on hot bricks in the pavilion. Mademoiselle Lenglen, whose muscular balance and accuracy of action were phenomenal, was of a most unstable temperament, while G. C. Macartney ruined a season, according to the papers, owing to "nervous breakdown." And I can assure Dr. Kerr that a lifelong devotion to cricket has not inured me to the screech of a diving aeroplane; while, to take up the cudgels for the really untidy, if untidiness is a precursor of instability, the mental hospital is very near for me.

Surely all the evidence points to the facts that these physical traits are concomitants (not precursors) not of neurosis in general but of a certain type of highly strung individual, the type Winnicott describes as "nervy." Actually some of the worst anxiety states I have seen have been in heavy-weight boxers and policemen. If the predisposition to neurosis can be cured by such methods, why was I told by an orthopædic surgeon of repute that he liked to refer cases of poor posture to psychiatrists because so often they were secondary to psychological states? Or is the nervous child to be cured with the Victorian backboard between its shoulders? I have written with some heat about this, because Dr. Kerr has put forward the type of easy explanation which is so readily accepted by those who don't like psychogenesis, and I think it should be made clear that many would disagree. But there are more urgent general problems regarding current war neuroses which concern psychiatrists. I should, for instance, like to learn the experience of others whether it is ultimately undesirable for war neuroses to be treated somewhere which is absolutely safe, on the grounds that it is next to impossible to get them back to dangerous work afterwards. My experience is derived from a hospital which is reasonably safe, although practically every German aeroplane to London flies over it. I find that in cases of anxiety following exposure to bombing the fact that from the very start the patients are subject to incessant alarms, dronings, and not too distant bangs has a bad effect. It never really gives them a chance to settle down.

Another matter is raised in your excellent leading article on casualties in London, in which you urge that provision should be made "to give patients the sense of security for which they crave." Might one not add—to which they are entitled? This question of shelter is extremely important. The "anxiety states" of war are really "fear states"; a 500-lb. bomb seems to be entitled to be called a pretty good reality situation. Prophylaxis therefore consists in doing all that is possible to give security, which for many means being underground. Apart from the physical pros and cons, it seems to me that if a *feeling* of security can be attained this in itself is of considerable importance. Recently two of my "anxious" patients begged to be discharged home to Dover! Their reason was that at least there was some kind of shelter there, yet I hope we are far safer here. More important in prophylaxis than the avoidance of the valgus position of the feet is the promotion of security and sleep by the provision of better 'oles for the population to go to.

Kent. W. LINDESAY NEUSTATTER.

TREATMENT OF WAR NEUROSES

SIR,—Recent correspondence illustrates the present tendency in medical circles to look upon the psychologist with suspicion and mistrust. The present war appears to have been seized upon as an opportunity to regress to the year 1917 and again to discourage this form of therapy. Memories are short in such matters. The more materially minded of the medical profession still resent illnesses of emotional origin, as is shown by the tendency to laugh at or bully such unfortunate sufferers. They forget the need for such treatment that arose after the last war and will arise after the present conflagration is over. The good work done by psychologists of the Ministry of Pensions from 1919 onwards seems either forgotten or denied. The West End Hospital for Nervous Diseases has long recognised the necessity for a department that could handle in civil life the need of the psychogenically afflicted. In the beginning each physician on the staff had a psychotherapist attached, to whom he passed such cases as needed this special treatment. It was found so successful that later a special psychotherapeutic department was set up and is still in existence.

One would have thought that such a national calamity as war, with the tendency it must bring with it to neuroses, civil and military, would have called for the further help of accredited psychologists, but the opposite appears to be the case. The Germans have harnessed mass psychology to their war machine with considerable success. If they can appreciate its importance to the masses as a means of destruction, we should not fail to recognise its power as a constructional factor for the individual. Under strain each man has his breaking point and it would be a pity that a legacy, from the war, should be left of a number of the population broken in spirit and unfit adequately to discharge their obligations as citizens, especially when they could by proper treatment become re-adjusted to life.

London. A. C. WILSON.

PSYCHIATRIC COMPLICATIONS OF HYPOGLYCÆMIA

SIR,—In your issue of Oct. 5 Dr. Wauchope states that she knows of only one case in which profound mental changes followed hypoglycæmia. If she will refer to the work of N. Malamud and L. C. Grosh (*Arch. intern. Med.* 1938, **61**, 579), A. B. Baker and N. H. Lufkin (*Arch. Path.* 1937, **23**, 190), Baker (*Ibid*, 1938, **26**, 765), and G. de Morsier and J. J. Mozer (*Ann. Méd.* 1936, **39**, 474), and other Continental and American writers quoted in my report, she will find that the occurrence of cerebral damage following hypoglycæmia is now well established by clinical and experimental evidence. On the physical side the response to glucose and the normal cerebrospinal fluid in the first case do not support a diagnosis of encephalitis; while psychiatric examination showed a generalised dementia with blurred focal signs representing a sharp and considerable deterioration from his former level. The second case was reported as a hypoglycæmic behaviour disorder and not as illustrating permanent mental damage, although this is probable. There was no evidence that either child was congenitally mentally defective.

Barrow Gurney. E. W. ANDERSON.

COMBATING SLEEPLESSNESS

SIR,—Dr. Harris advocates the use of bromides in large doses as an antidote to air-raid insomnia. He states that most people can take gr. 30 of sodium bromide three times a day "quite easily." Admittedly the consumption of this quantity is not difficult, but unfortunately the use of a draught of cold water, recommended to "wash away the taste," will not have a comparable effect on the risk of subsequent bromism. It should be more generally known that bromides are excreted slowly and that a toxic psychosis may develop within two weeks of the patient taking as small amounts gr. 45 to gr. 60 a day. Elderly or arteriosclerotic people are especially prone to develop symptoms that will persist for weeks. Weakness, inability to concentrate and broken sleep occur frequently, so that there is a very real risk of the condition being missed and the amount of bromide increased in the vain attempt to counteract its own ill-effects. Sleeplessness during air-raids is mostly due to anxiety, which can best be countered by promoting as far as possible a sense of security. Drugs and more particularly a combination of them have their place, but unless they are used with more circumspection than Dr. Harris suggests we shall have a fresh group of casualties, produced by the inconsequential therapy of our own profession.

Bristol, 8. T. M. LING.

CLASSIFICATION AND EVACUATION POINTS

SIR,—I am in charge of a first-aid post in a district which has suffered rather badly, and I can confirm from experience what you say in your leading article of Oct. 5 about the great advantage of having the post situated underground. The patients I have seen at the post appear to be quite happy while there, in spite of bombs dropping in close proximity to our building. But several of them were very frightened at the idea of having to go for further treatment to one of our local hospitals. Two of these had been put out of action by aerial attack, and it is easy to appreciate the feelings of a person who, having been lucky enough to survive one bombardment, is sent to bed in a place which he does not believe perfectly safe.

As you say, it is wise to prepare for the battle of London to last for some time and increase in severity, and casualty clearing points after the style suggested by Dr. Shirlaw in his book would be very helpful. It should not be difficult to find places for them. As an example, the first-aid post in which I work appears to me ideal. It is close to the railways, and has good wide roads approaching it, so that ambulances can reach it direct, and they can be unloaded beneath a roof. It is underground, and is protected above by a large steel-framed building with several floors of reinforced concrete. The post is a considerable distance from any hospital, and has accommodation for several hundred patients. The heating, lighting and water arrangements present no great difficulty. We have a constant supply of hot water and electricity, and the post could be effectively heated at a minimum cost.

I can see the great advantage of a place such as this being used as a casualty clearing point. At the moment we are only using a small portion of the space available as our first-aid post and I often feel sorry that we cannot keep some of our patients for further treatment rather than transfer them to a hospital which does not present the same degree of safety, and from which they will be evacuated to the country a week or so later.

There is need for immediate action in this matter, rather than waiting until more of our hospitals are either disorganised or rendered completely useless.

MAX SAYERS.

SHELTER PALSY

SIR,—During the past few weeks I have observed five cases of sleep palsy of the musculo-spiral nerve. In all of these paralysis was first noticed after sleeping on the concrete floor of air-raid shelters. One hopes that with the provision of bunks in shelters these cases of "shelter palsy" will soon become things of the past.

Harley Street, W.1. SIMON BEHRMAN.

MORPHIA IN BLAST CONTUSION OF THE LUNG

SIR,—Your annotation of Oct. 5 (p. 426) suggests the cautious use of ¼ grain doses of morphia in blast injury to the lung. It is not a sound principle of therapy to deny the full use of a unique and advantageous drug unless its incidental deleterious effects cannot be avoided or controlled. This, I submit, does not apply to morphia in the case cited. The proper use of oxygen, carbon dioxide and other respiratory stimulants should counter both the peripheral and central respiratory depression of morphia. Full doses of this drug—by all means the heroic half grain dose—should be used as the patient's general condition indicates, and where controlled oxygen and carbon-dioxide administration is available, as with the B.L.B. inhalation apparatus described in the M.R.C. war memorandum on wound shock. When the general rest of morphia is no longer necessary it may be desirable to consider the use of local methods of resting the injured lung. If a pneumothorax is to be induced, it is as well to remember that the Scylla of infarcted lung and pneumonia and the Charybdis of continued hæmorrhage, which Riviere envisaged in the use of morphia in hæmoptysis, may also have to be negotiated here.

London, S.E.12. C. W. M. WHITTY.

VISCERAL PAIN

SIR,—In your issue of Sept. 28 Dr. Bentley and Dr. Smithwick state that Kellgren and myself in our paper in *Clinical Science* (1939, **4**, 47) have denied pain sensitivity to the bowel. We discussed this question briefly from a historical standpoint, and after considering the evidence at our disposal said that "it is difficult therefore not to accept Lennander's conclusions." This is a much more diffident summing up than the pronouncement ascribed to us. They also say that we suggest that bowel pain arises from traction on the sensitive mesentery. This again does not properly represent us; we did not make the suggestion but pointed out that Lennander had. I would not discuss the two points of disagreement with sentences of a paper whose original observations I appreciate whose general tenor I am in substantial agreement were it not that I have yet to express my own views fully on these matters, and am unwilling to seem committed to the complete exclusion of the bowel as a direct source of pain. I feel sure that on re-reading our text Dr. Bentley and Dr. Smithwick will recognise that they have unwittingly carried our views farther than our text intended.

London. THOMAS LEWIS.

STONE-MILLED FLOUR

SIR,—We seem to have reached a climax of folly in eliminating a natural essential vitamin from our flour only to find ourselves under the necessity of replacing it artificially. When I was a boy, and for centuries before, the farmers sent their wheat to the local mills which abounded on the River Kennet. The wheat was ground and the resulting flour was supplied to the local bakers and to private households. The offals went back to the farmers. There were two kinds of flour, one called "wholemeal," the other "white flour," a very different article to the white flour provided by the steel mills of today. For many years now the old mills have been gradually driven out of business by the big steel-roller millers. During this time there has been a steady increase in various illnesses in this district, notably those of a catarrhal nature, a deterioration of the general health, and, I am inclined to believe, a marked decline in fertility. In my early days, fifty years ago, meat was a luxury enjoyed by the few. The agricultural labourers never had it more than once a week and probably not so often. But they had the local bread and they also had milk for their families. Those of today, in spite of what is described as a higher standard of living—which might in many respects be interpreted as more expensive—do not seem to have the stamina of fifty years ago, though I admit there has been improvement in general physique from that of 1914. I have no doubt in my own mind that a main cause of the increase in catarrhal disease is the deterioration in the quality of the flour.

It was stated in the House of Commons that it was impossible to organise a change of milling processes in war-time. I believe that with little effort many of the old mills could be set working again and a vast economy effected. There would also be the advantage of a lessened concentration of vast stocks in one area and a consequent lessened chance of big losses by air-raids.

It has also been stated that people demand the white flour as produced from steel roller mills. I do not believe they would if they had the chance of eating bread made from the "white flour" of the stone mills, and probably a large number would even prefer the wholemeal flour. I use home baked, stone-milled flour bread in my house and it is regarded as a great treat by all, of whatever class, who taste it. Another argument against the use of a larger portion of the wheat for bread was that it would reduce the value of the offals. I think the farmers would be glad to have the chance to get the offals of the stone-milled flour locally, rather than see the bulk of them exported to the continent direct from the steel mills, as was happening till the war prevented it.

Marlborough, Wilts. W. B. MAURICE.

M.R.C. MEMO ON GAS GANGRENE

SIR,—As one who had some part in drawing up the scheme for the bacteriological investigation of wounds on behalf of the War Wounds Committee, might I point out that in your leading article of Oct. 5 you have not quite grasped its real purpose? The scheme suggested was not intended for fully equipped laboratories but for smaller laboratories—field laboratories and certain hospital ones—where there is a lack of complete facilities for carrying out the finer bacteriological examinations such as toxin estimations and pathogenicity tests. In any case the identification of anaerobes by toxin production, particularly *Clostridium welchii*, is still in the experimental stage, and at the present moment identification is best carried out by fermentation reactions and cultural appearances. Lastly, the objection to screw-caps was surgical.

Stoke Mandeville, Bucks. JAMES MCINTOSH.

STATE MEDICAL SERVICE

SIR,—During the war we have been witnessing the functioning of what one of your contemporaries calls "a state medical service administered by the Ministry of Health in association with the local health authorities," to wit, the Emergency Medical Service. An unbiased examination of its activities during the past twelve months should be of assistance to us in the contemplation of a similar service permanent under peace (or even war-time) conditions. At the beginning we were informed that the blundering and short-sighted methods of the past were to be replaced by a more modern and more efficient administration, and despite these innuendoes the profession fell into line. But let us for our future information contemplate the harvest: alterations and adjustments and again further alterations and adjustments in the pay and conditions of service of E.M.S. officers, resentment and recrimination over recruiting and other medical boards, indecisions and uncertainty over pensions to E.M.S. officers or their dependants in case of injury or death during execution of their duties. Still, as a surgeon to two hospitals, one of 100-plus beds and another of 200, I was not unduly dissatisfied with my lot until I discovered that according to the Ministry of Health my real designation was that of "an inhabitant of a county-council area," of which the county M.O.H. is in control as group officer, charged with organisation and administration. In this area, which is a defence area on the south coast containing a considerable number of troops, the position after twelve months of war—during which like other people we have had our bombs and casualties both fatal and otherwise—is as follows:—

(1) The only general hospital has been "enlarged" by placing extra beds in the wards, amounting roughly to one extra bed for each 1000 members of the contributory scheme.

(2) A new E.M.S. hospital of over 100 beds has been created on the edge of the cliffs amongst the barbed-wire entanglements of the front-line troops which would have to be evacuated in the event of an attempted invasion, but the Ministry of Health continues to enlarge and expand it.

(3) A hospital of over 100 beds with a class-I E.M.S. officer resident there (salary £550 per annum), and an excellent nursing staff, is equipped with the sterilising apparatus borrowed from a neighbouring cottage hospital of 11 beds, and the metal rationing now prevents the purchase of new sterilisers.

(4) The county-council hospital has been considerably enlarged, but there is no theatre and the medical staff consists of one visiting general practitioner and sterilising equipment for 12 maternity beds.

The object of this letter is not to bore with our local conditions those who are I hope more happily situated, but to provide illustrations of the results of what a genius for disorganisation can achieve. May I advise the younger members of the profession in particular to think again before they surrender their careers and future too freely to "a state medical service administered by the Ministry of Health in association with the local health authorities." For them at any rate I am afraid such a step will become inevitable. Let them see to it that when this crisis comes they take steps to provide such adequate safeguards as a united front alone will ensure.

1914 STAR, F.R.C.S.

SCOTLAND

(FROM OUR OWN CORRESPONDENT)

UNIVERSITY EDUCATION

SPEAKING of the British universities at a meeting of the Royal Philosophical Society of Glasgow Sir Hector Hetherington, principal of Glasgow University, said that about one in every 1000 of the population of Britain was a university student. In Scotland the proportion was nearly one in 500, in Wales one in 750, and in England one in 1080. There were some striking differences in the resources of the universities. The income of Oxford and Cambridge was much in excess of any others. London University had an annual revenue of nearly £2,000,000, the civic universities of England about the same, the four Scottish universities £880,000 and Wales just under £400,000. Measured against the load of their teaching work the income of the Scottish universities was on a far lower level than that of any other group. The universities accepted the function of organised research as well as teaching and a substantial part of their revenue and energies were devoted to that purpose. Large-scale material equipment was often called for since scientific research was largely a matter of coöperative team work. The range of the service of the universities had steadily expanded over the last 100 years and demands would continue to increase as national life became more complex and called for higher levels of competence in every branch of professional activity. There were difficult material problems ahead but the most difficult and crucial problem was not material but spiritual or educational—the problem of providing, through the rarified disciplines of highly specialised modern curricula, an experience which enriched and unified the mind.

CHEAP MILK IN FIFE

Dr. G. Matthew Fyfe, county medical officer of Fife, has expressed the suspicion that milk supplied under the national milk scheme is finding its way to a disproportionate number of people in a position to purchase milk without assistance from public funds. He reported that during the three months to Sept. 30, 4949 applications for cheap milk and 1919 for free milk had been received. It had been estimated when the scheme was first mooted that there were about 20,500 expectant mothers and children under five years of age in the county and that probably two-thirds would apply. The number of applicants was increasing daily. Many applications had been received from teachers, policemen, salaried officials, and professional and business people. They were perfectly entitled to apply but the scheme had been mainly aimed at benefiting working-class people who were not in a position to purchase all the milk their children required. The scheme had not been in operation long enough for a critical review to be made of its merits, but Dr. Fyfe felt there was justification for the doubt whether its benefits justified the financial outlay. The scheme in its present form was unwieldy. It was startling to realise that when one pint of milk was issued eight forms had to be filled in, some of them in duplicate. The

amount of clerical work was assuming formidable proportions, so much so that some dairymen had indicated their intention of ceasing to participate in the scheme.

MICROSCOPES WANTED

The Department of Health for Scotland has made an urgent appeal to doctors, scientific workers and others who can spare their microscopes to lend them for use in the hospitals of the Emergency Medical Service. The hospitals need microscopes with the ordinary low and high power objectives without mechanical stages as well as instruments equipped with oil-immersion objectives and mechanical stages. Sub-stage condensers are desirable. Instruments which are lent will be returned in good condition at the end of the war. Those which are offered for sale should be fully described and the price indicated.

Appointments

ALMOND, SIMON, M.D. Manc., M.R.C.P. : hon. asst. physician to the Salford Royal Hospital.
COLLINGWOOD, F. C., M.B. Brist. : M.O. at Gambia.
DAY, MARY T., M.B. Lond. : temp. asst. M.O. (maternity and child welfare) for Northampton.
DAVIES, H. L., M.Ch. Lpool : surgical registrar at the Royal Liverpool Children's Hospital.
DEBOVITCH, LOUIS, M.B. Sheff. : resident orthopædic officer at Grimsby and District Hospital.
FIDDICK, T. L., L.D.S. Eng. : temp. asst. dental surgeon for Exeter.
HAY, JANNETT C., M.D. Lpool : medical registrar at the Royal Liverpool Children's Hospital.
LANE, R. E., M.B. Lond., F.R.C.P. : hon. physician to the Salford Royal Hospital.
THOMSON, M. L., M.D. Aberd., M.R.C.P. : hon. asst. physician to the Salford Royal Hospital.
WINTER, HARRY, M.D. Toronto : R.S.O. at the Coventry and Warwickshire Hospital.
WINNING, JOHN, L.R.C.P.E. : Asst. M.O. for Glasgow.

Births, Marriages and Deaths

BIRTHS

CROSS.—On Oct. 11, at Petersfield, the wife of Mr. Alexander G. Cross, F.R.C.S.—a daughter.
DEAN.—On Oct. 6, at Newton Abbot, the wife of Surgeon Lieut.-Commander D. M. Dean, R.N.V.R., of King's Lynn—a daughter.
GOADBY.—On Oct. 8, at Woking, the wife of Dr. H. K. Goadby—a daughter.
GUNNERY.—On Oct. 9, at Maidstone, the wife of Surgeon Lieutenant Oswald Gunnery, R.N.V.R.—a son.
HAMILTON.—On Oct. 8, at Blundellsands, Lancs, the wife of Mr. C. John K. Hamilton, F.R.C.S.—a daughter.
PORTER.—On Oct. 8, at Northampton, the wife of Dr. Hugh Lachlan Porter, of Woodbridge—a son.

MARRIAGES

BRIGGS—THURSTON.—On Oct. 5, at Ruislip, Geoffrey O. A. Briggs, M.B., elder son of Dr. J. A. Oswald Briggs, of Nottingham, to Betty Maisie Thurston.
DAVIES—ERNEST.—On Oct. 5, at Cambridge, David Vaughan Davies, M.B., to Ruby Bertha Ernest.
TURQUET—HUNTER.—On Oct. 12, at Farnham, Pierre Turquet, M.R.C.S., Lieutenant, R.A.M.C., to Ellen Clare Hunter.

DEATHS

FRANCIS.—On Oct. 13, at Hastings, Alfred George Francis, O.B.E., M.B. Lond., F.R.C.S., F.S.A., aged 77.
HEAD.—On Oct. 8, at Reading, Sir Henry Head, M.D. Camb., F.R.C.P., F.R.S., aged 79.
ROBINSON.—On Oct. 9, at Stanhope, co. Durham, William Robinson, M.D., D.Ch. Durh., F.R.C.S., J.P., aged 80.
STRATHY.—On Oct. 12, at Birmingham, Frederic Rolph Lee Strathy, M.D. Toronto, M.R.C.P.E., aged 91.
WEBB.—On Oct. 7, at Hadley, Cheadle, Cheshire, Frank Webb, M.R.C.S., D.P.H.

THE use of iron sulphate has been suggested (*Lancet*, Sept. 14, p. 340) as a substitute for other iron salts which do not justify importation or manufacture in war-time. There is some doubt (*Ibid*, Sept. 21, p. 366) whether ferric salts are absorbed as such. Mr. H. W. Tomski, M.P.S., chemist to Damancy & Co. Ltd., writes about a prevalent belief that ferrous sulphate cannot be given in watery solution because of its instability, and mentions the following formula which he has published (*Pharmaceut. J.* 1939, **1**, 239) for a stable liquid preparation :

Ferrous sulphate	2·500	Essence of pineapple	0·125
Copper sulphate	0·006	Oil of lemon	0·025
Dilute sulphuric acid	2·000	Acid fuchsine	0·006
Citric acid	0·200	Yellow dye (for acid)	0·050
Lime juice	6·000	Chloroform water to	100·000
Dextrose	20·000		

An elixir has since been put on the market containing gr. 3 of ferrous sulphate (approx. 39 mg. of metallic iron) to the ounce.

Medical News

University of Cambridge

The titles of the degrees of M.B. and B.Chir. have been conferred on M. K. Cole of Newnham College.

University of Sheffield

Dr. F. T. Thorpe has been appointed temporary lecturer in mental diseases.

University of Manchester

Dr. T. E. Barlow and Dr. Sidney Mottershead have been appointed assistant lecturers in anatomy in the university.

University of Wales

At a recent examination for the diploma in public health Phyllis E. M. Bowen and Nancy G. Rogers satisfied the examiners in part I.

Royal College of Surgeons of England

A quarterly meeting of the council was held on Oct. 10, with Mr. Hugh Lett, the president, in the chair. Mr. H. A. Lane was admitted as a Macloghlin scholar and Mr. G. R Davies was nominated as the 48th Jenks scholar. A diploma of fellowship was granted to W. S. Lewin (Univ. Coll.). The posts of chief surgical officer, senior fellow in surgery, fellows in surgery, and resident surgical officers at the Prince Henry Hospital, Sydney, were recognised for the six months' surgical practice required of candidates for the final examination for the fellowship.

Diplomas of membership were granted to the following :—

S. M. Ali, J. F. Bourdillon, D. F. Cocks, R. V. Dent, G. B. Locks, J. N. Malins, Mangadu Rathnavelu, Peter Smith, N. C. B. Trapps, and P. D. Trevor-Roper.

A licence in dental surgery was granted to R. A. Zorab.

Diplomas in child health were granted, jointly with the Royal College of Physicians, to the following :—

A. J. W. Beard, Jack Fiddes, A. N. Ganguli, M. J. Parsonage, Cicely Steer, and John Thomson.

The Thomas Vicary lecture which was to have been delivered by Dr. Arnold Chaplin on Nov. 14 has been postponed. The museum is closed but the library will remain open.

Royal Faculty of Physicians and Surgeons of Glasgow

At a meeting of the faculty on Oct. 7, with Mr. Roy Young, the visitor, in the chair, the following were admitted to the fellowship :—

G. J. Aitken (Bellshill), J. D. Arthur (Slamannan), George Bankoff (London), Alexander Brown (East Kilbride), William Clement (Glasgow), David Douglas (Glasgow), D. C. Miln (Glasgow), D. H. Wallace (Renfrew).

British Homœopathic Association

The annual meeting of this society will be held at the London Homœopathic Hospital, Great Ormond Street, London, W.C.1, on Wednesday, Oct. 23, at 2.30 P.M.

West Indian Welfare Fund

Sir Rupert Briercliffe, formerly director of medical services in Nigeria, has been appointed medical adviser to this fund.

X-ray Therapy Equipment

At the State Institute for the Study of Malignant Diseases in Buffalo, New York, a million-volt X-ray therapy unit has been placed in a new three-story wing which will provide beds for 78 patients and accommodation for the director, the staff, and the administrative offices. There are also examination and treatment rooms attached to the X-ray and radium department.

Million-volt units are also installed in Memorial Hospital, New York City, and St. John's Hospital, Cleveland, Ohio. Speaking of the new unit Dr. Edward Godfrey, Jr., state commissioner of health said : "Unlike the less powerful X-ray therapy equipment of only a few years ago which required housing in a separate building, this new high-voltage machine occupies a single room. With its half ton of protective lead the entire unit weighs only about 4,000 pounds. . . . The institute's radiation equipment includes a 140,000-volt unit for intermediate therapy, one 400,000-volt outfit, three 220,000-volt machines for deep X-ray therapy and 8 g. of radium."

PHARMACEUTICAL SPECIALITIES (May & Baker) Ltd., Dagenham, announce a reduction in the price of their product Dagenan (M. & B. 693).

Notes, Comments and Abstracts

PHYSICAL THERAPY IN ARTHRITIS

PHYSICAL therapy is perhaps the most important single method in the armamentarium of the physician called upon to treat arthritis and rheumatism in its various forms. Once a diagnosis has been made a programme of treatment must be mapped out which should include, in addition to physical therapy, elimination of foci of infection and correction of repeated joint trauma or strain associated with occupation, sport, obesity, flat-foot or scoliosis. The diet must also be adjusted, and drug and vaccine treatment, psychotherapy and environmental conditions considered. Three groups of physical measures should be taken into account: those producing heat; massage, manipulation and splinting; rest, exercise (muscle re-education) and postural re-education. Krusen [1] has recently pointed out that it is not necessary to transfer a patient to an institution in order to apply this type of treatment. Simple measures and apparatus can be devised in his own home at small cost; these include the application of hot paraffin wax to swollen joints, contrast baths, simple massage as an adjunct to more skilled treatment, manipulation and the prevention of deformity by means of simple splints and postural exercises. He considers that the general practitioner can be responsible for preventing the occurrence of arthritic deformities, especially adducted shoulders, kyphosis and fixation of the thorax, flexion of the elbows, wrists and knees, adduction of the hips, and foot-drop.

Hench has pointed out [2] that even when a patient has benefited by prolonged physical treatment in an institution the improvement may be lost on his return home unless treatment can be continued there. The average patient with arthritis or chronic rheumatism is unable to stay in hospital indefinitely, for financial reasons, and must be given a substitute at home for the more elaborate physical therapy of hospital. W. S. C. Copeman [3] discussing the treatment of rheumatism in the army has described simple methods for use where electric power is not available. Rest, both general and local, is essential for an arthritic patient during the acute inflammatory stage, but the pain alone is not a reliable indication of inflammation, and if accepted as such may serve to perpetuate the period of rest, and so favour the formation of adhesions. Once these have formed the only hope lies in manipulation, which used simply, need not be the monopoly of the orthopædic surgeon. Medical orthopædics, to use Mennell's term, includes the consideration of simple joint supports, the correction of shoes for minor degrees of flat-foot, and postural training to avoid abnormal strains on the joints. Our responsibility towards the rheumatic or arthritic patient does not end when he is sufficiently recovered to leave his bed, and the logical continuation of physical medicine is to be found in occupational therapy. This phase in the rehabilitation of the rheumatic patient is still in its infancy and will no doubt receive further study in association with the movement for a national rehabilitation board recently advocated in the columns of the *Times*. Many simple devices and occupations can be adopted in the home to strengthen the wasted muscles and increase the movement of stiff joints. The appointment of Sir Robert Stanton Woods as consultant in physical medicine to the Army is likely to lead to advances in this field.

A HOSPITAL STRETCHES ITSELF

WHEREVER we look today we notice economies, retrenchments, and services cut down, sometimes with anything but good effect. Hospitals, at least, should be risking a wise extravagance at a time like this, and it is pleasant to know that St. James's Hospital at Leeds has just opened new extensions. The aim has not been to increase the number of beds, which remain at the old figure of 1300, but to improve diagnostic and remedial services, and to give better accommodation to the nursing staff. The newly built nurses' home will take 369 nurses and 39 other staff; it contains a spacious common room, floored like a ball-room with maple, a comfortable library, and nurses' quarters in which each room is supplied with a built-in wardrobe and dressing-table, a divan bed, easy chair, lavatory basin, radiator and heated towel-rail. It is long-sighted policy on the part of any hospital committee to make its nurses comfortable.

Another new block contains the operating-theatre suite, X-ray, massage and electrotherapeutic departments and the nurses' training school, with lecture- and class-rooms, a model ward and a cookery room. The two new theatres on the ground floor communicate with the existing operating-theatre, so that the three form an operating-suite. A new pathological unit contains laboratories for chemists and pathologists, animal room, lecture-room, museum, post-mortem room and chapel. An extensive range of basements beneath the new and old buildings are intended in future to provide storerooms, but at present they are fulfilling a more useful function as an emergency casualty department and protected operating unit. A small admission block included in the scheme is also doing war-work as a unit for the treatment of injuries of the face and jaw.

MEDICAL STUDENTS IN U.S.A.

THE American medical schools have more applicants yearly than they can accept. From educational data appearing in the *Journal of the American Medical Association* (Aug. 31, p. 685) it seems that students entering in 1938–39 numbered 5754, and in 1939–40 the comparable figures was 5794. These are lower than the entries in the earlier part of the decade when they were always above 6000. The numbers reaching the fourth year of training, however, have remained about the same over the 10-year period, being 4909 in 1930–31 and 4894 in 1939–40. The loss of students during training therefore diminished from 1548 at the beginning to 833 at the end of the decade. In 1935–36 the number of students entering was 6005, of whom 1019 had dropped out by the end of the second year of training; but it is worthy of note that although in 1937–38 only 5791 freshmen were enrolled, only 870 of these had given up by the end of the second year; so that a decrease in the size of the entering class does not necessarily mean a corresponding reduction in those qualifying.

Of the 87 medical schools 2 have annual fees of under $100 (£25), 7 have fees between $100 and $200 (£25–£50) and 62 have fees ranging between $200 and $500 (£50–£125); in only 16 are the fees over $500. An odd position has arisen in relation to American students studying in Europe. In the spring of 1939 there were at least 500 over here, most of them studying at extramural schools in Scotland. The State Department decided to discontinue visas to the combat areas, with the result that the education of these students was interrupted. They applied to American schools, either to enter the 1939–40 class or for permission to join a class appropriate to the stage of education they had reached, but without much success; the overcrowded schools could not take them. A group of 390 students from Scottish schools formed an association and appealed to the educational agencies to find them places. The Council on Medical Education and Hospitals, however, decided that the individual medical schools must be allowed to determine whether to accept these transferred students or not, and other educational bodies have reached the same decision. The State Department agreed in March to issue visas for Switzerland, but he will be an intrepid student who thinks he can concentrate on medical studies in the middle of Europe today.

1. Krusen, F. H. *J. Amer. med. Ass.* Aug. 24, 1940, p. 605.
2. Nelson Loose Leaf Surgery, New York, 1936, vol. iii, p. 104.
3. *J. R. Army med. Cps*, 1940, **74**, 277.

INTERNATIONAL LABOUR OFFICE.—An organising centre of the International Labour Office has now been established in McGill University, Montreal. Publications hitherto supplied to it should be sent to the director of the London office (at Cousens, Rudgwick, Sussex) for transmission to Canada.